

# THE MEDICAL NEWS.

A WEEKLY JOURNAL OF MEDICAL SCIENCE.

VOL. LXIX.

NEW YORK, SATURDAY, OCTOBER 17, 1896.

No. 16.

## ORIGINAL ARTICLES.

### LEUCOCYTOSIS AND IMMUNITY, WITH A CRITICAL ANALYSIS OF THE THEORY OF NUCLEIN-THERAPY.

BY WALTER A. WELLS, M.D.,  
OF WASHINGTON, D. C.

THE establishment of a therapeutical system, founded upon nature's own process of protecting the living organism against disease, is one of the highest aims of scientific medicine. In the past few years, accordingly, there has been an extraordinary development in our knowledge of natural and acquired immunity. Should we ultimately realize the end of these researches, a mass of empirical formulæ will be replaced by rational and precise methods.

The theory of Asclepiades was a remarkable foreshadowing of modern cellular pathology. According to him, the body was made up of numberless atoms and pores, the disturbance of whose normal distribution and symmetry resulted in a departure from health.

But humoralism, set upon the march by Hippocrates and receiving afterward the indorsement of the great Galen, withstood all attacks, and remained paramount throughout the Middle Ages.

Virchow showed the great rôle the living cells play in the living organisms, and Metschnikoff would still farther elevate their importance and significance in the struggle of the organism against disease. But ancient humoralism again appears in the garb of modern serum-therapy.

Very recently there has been propounded by certain French authors a theory that resembles still more closely the old humoral doctrine. This is the so-called theory of "internal secretion," according to which the most diversified glands of the body contribute to the preparation of the blood, furnishing it, perhaps, with enzymes destined to neutralize poisons produced as a result of metabolic change. The secretions from any one gland, moreover, can compensate for the failure of any other.<sup>1</sup>

In 1892, there was waged, especially in England, a bitter warfare over phagocytism and its relation to immunity. Klein asserted that the cell constituted a retreat into which the microorganism entered to avoid the bactericidal influence of the

fluids. German pathologists chiefly brought forward some powerful arguments deduced from experiments, to show that the lymph or serum possessed "antibiotic" properties.

Baumgarten<sup>2</sup> did most to discredit phagocytism in Germany, and brought the strongest proof to establish the serum doctrines. He claimed to have demonstrated by experiments that degeneration and disappearance of the bacilli occurred in the lymph-fluids. Buchner<sup>3</sup> contended that the blood-serum destroyed the bacteria, and that the leucocytes, acting as scavengers, afterward carried off the already devitalized microorganisms.

But almost immediately we began to hear that these two schools were not really irreconcilable. Sanarelli,<sup>4</sup> for example, in 1893, wrote:

Le grande nombre d'arguments apportés par M. Metschnikoff et son école en faveur de cette théorie phagocytaire n'a pourtant pas empêché d'invoquer pour expliquer l'immunité vaccinale, d'autres conditions statiques consistant en des propriétés chimiques du sang et des humeurs, qui seraient en état de protéger à eux seuls l'organisme.

But Sanarelli, Massart, Werigo, Isaëff, continue to maintain that the essential factor in immunity is the phagocytic leucocyte, and deny the claim of Behring and Nissen, Foa and Carbonne, Emerich and Fawitzky, Krouse and Pansini, that the blood of a protected animal is directly destructive of bacteria (bactericidal theory); as also the theory advocated chiefly by Charrin and Rogers, that the microorganisms were not destroyed in the serum, but only divested of their pathogenic properties (theory of attenuation); and likewise the contention of Behring and Kitasato, G. and F. Klemperer, Mosny, and more recently of a host of others, that the serum may contain a substance which neutralizes the toxins produced by the bacilli.

The phagocytic theory has recently been made the foundation of a new therapeutical system, the nuclein-therapy, which has a wide-spread popularity in this country. An agent, essentially the same as nuclein, had been employed by the enemies of phagocytosis, in order to combat this theory. There had been described by Wooldridge, in 1888, a new method of "chemical protection." He used a solution of what he called "tissue fibrinogen," which he prepared from the thymus and testicles of animals. Injecting this agent into

rabbits, he claimed that they were thereby rendered immune against subsequent inoculation of anthrax.

Harkin, an opponent of phagocytosis, made some study of this principle, and added the idea that it possessed bactericidal properties. Wright<sup>4</sup> followed closely the formula which Wooldridge had used in preparing his "fibrinogen," and studying the same chemically, demonstrated conclusively that this agent was of the nature of a nucleo-albumen or nucleo-protein. This statement was to an extent substantiated by the fact that fibrinogen introduced into the system produced leucocytosis, since there had just then been published Horbaczewski's<sup>5</sup> famous work, wherein it is shown that the effect of nuclein is to increase the number of white blood-corpuscles.

This property of nuclein, to cause a leucocytosis, is the fact to which the advocates of the nuclein-therapy now point as the proof of the curative powers of that agent. Upon the theory of phagocytosis it is plain, they tell us, that if you have an increase in the number of the leucocytes, the enemies of the bacteria, the system is better fortified against disease. The premises are as simple as could be wished. Let us therefore inquire thoroughly into them.

It is known that nuclein belongs to the albuminoids, a class nearly related to the proteids, in their percentage composition, in their colloid nature, and their considerable proportion of nitrogen. Nuclein is rich in phosphorus, soluble in weak alkalies, and precipitated by weak acids. True nuclein yields as a decomposition product xanthin bases, a fact first demonstrated by Kossel,<sup>6</sup> and is thus distinguished from the others, as para-nuclein.

Horbaczewski showed that the nuclein of spleen-pulp yielded in the presence of oxidizing agents uric acid. Administering nuclein, moreover, he obtained an increase of the uric acid in the urine of man. The uric acid thus excreted in excess of the normal was thought to be formed out of the white blood-corpuscles. Weinbrand,<sup>7</sup> however, has reached conclusions to the effect that the increased uric acid is in all probability formed from the xanthin bases of the nuclein, and does not depend upon a leucocytosis.

Accepting this view, we may ask whether the leucocytosis is not the result of the uric acid, for it is known that uric acid has the power to bring about such an effect. At the same time, another pertinent question is: Why may we not assume for those other agents which give rise to a leucocytosis the same therapeutical virtues that we

assume for nuclein, since this action is the ground of its claims?

As long ago as 1856, Hirt<sup>8</sup> had seen an augmentation of the leucocytes follow the inhibition of certain "tonisirende mittel," especially tincture of myrrh.

In 1876, Binz<sup>9</sup> made similar observations as to ethereal oils, especially turpentine and camphor. Pohl<sup>10</sup> enlarged the list very materially in 1888, showing that a leucocytosis ranging from 25 to 125 per cent. was produced by the following substances: Subnitrate of bismuth, oxid of iron, acetic ether, oil of fennel, oil of cloves, oil of peppermint, tincture of myrrh, oil of turpentine, vanillin, musk, absinthe, quassia, gentian, piperin, and strychnin.

Cutler and Bradford<sup>11</sup> were the first to observe that the same effect followed the administration of phosphorus, cod-liver oil, and quinin. Leber<sup>12</sup> produced a leucocytosis by the use of phlogosin, and Haidenhain<sup>13</sup> had the same result with leech-extracts. That the phenomena of leucocytosis follow upon the introduction of bacterial cultures, bacterial extracts, and alkali proteins into the system, we know well enough from the experiments of Arloing,<sup>14</sup> Somer,<sup>15</sup> and many others.

Among other agents which will give rise to leucocytosis are the following: Peptone, hemialbumose, uric acid, nucleinic acid, urea, urate of soda, curare, pyrocin, chlorate of soda.

All these agents give rise to a polynuclear leucocytosis, only those white corpuscles with multiple nuclei and neutrophilic granulations being increased.

The earliest view of leucocytosis was that of Virchow, who believed it was the result of the stimulation of the lymphatic glands, these being the glands chiefly, whose function it was to produce the leucocytes. Stimulation caused increased activity in these glands, and consequently an immediate over-supply of the corpuscles.

Virchow's theory of new production was later adopted by Von Limbeck, who added, however, the principle of chemotaxis as complementary to its solution, holding that those substances introduced into the system, with the power to produce a leucocytosis, acted in virtue of certain chemotactic properties (which will be discussed later) to attract the leucocytes from the blood-making glands. Von Limbeck thought he had strengthened this theory by experiments, in which it was seen that the blood in the splenic vein contained more leucocytes than that in the splenic artery. The physiological fact cited by Ehrlich,<sup>16</sup> that the

blood-forming organs sent forth into the circulation none but the mononuclear elements, was most fatal to this doctrine. Such a fact, clearly, seemed not to permit the idea of new production, when it was known that the majority of the leucocytes in these experimentally induced leucocytoses was of the polynuclear class.

Further investigation showed that an inequality in the number of the leucocytes in the arteries and veins in favor of the latter was the usual condition. Römer's theory was that a new formation of the white blood-corpuscles took place directly in the circulating blood. The substance introduced into the system and gaining entrance into the blood stimulated the corpuscles themselves, so that there resulted a division and new formation by the process of amitoses. Römer laid stress on the grouping of four to six cells, which he frequently observed in the slides of leucocytotic blood. But subsequent investigators attributed his grouping together of the leucocytes to the so-called "viscosity" (Virchow) of these elements, and the division-figures, which he claims to have so often seen, Schulz has affirmed to be merely the artificial lapping of one cell over another.

Löwitt,\* who was the first to bring into special prominence the universally admitted fact that "the increase in the number of the leucocytes is always directly preceded by a decrease," believed this preliminary decrease of leucocytes to be the result of wholesale disintegration of those elements, and applied therefore the term "leucolysis." He distinguishes from leucolysis, "leucopenia," or a poverty of the blood in colorless corpuscles, due to a diminished supply from the blood-forming organs. The latter was distinguished not only on account of a different causation (as exposure to cold), and in its more gradual onset, but also in the fact that here the mononuclear elements, those which come directly from the hematopoietic organs, are the ones which are chiefly wanting, whereas in leucolysis, the decrease affects chiefly the polynuclear class. It is especially because of the diminution being in the mononuclear elements, that the author concludes that this leucopenia arises from a lessened supply, since, as he observes, there is no reason to suppose a one-sided destruction, which affects only that class. Yet a one-sided destruction affecting the polynuclear is what this author is obliged to assume in his hypothesis of leucolysis, and this to my mind is one of the weak points of his theory. His experiments were all upon rabbits. Taking some blood from the

cervical vein of this animal, he made the following count:

Whole number of leucocytes	13,824
Mononuclear, 52.4 per cent.	7,243
Polynuclear, 47.6 per cent.	6,581
Erythrocytes, 7,490,000.	
Ratio, 1-542.	

An injection of one gram peptone, made five minutes later, gave this result:

Whole number of leucocytes	3142
Mononuclear, 77 per cent.	2419
Polynuclear, 23 per cent.	723
Erythrocytes, 6,290,000.	
Ratio, 1-2002.	

In other instances the decrease is yet more striking on the side of the polynuclear forms. Löwitt has not himself ventured an explanation of this partiality of the destructive substance, but one of his followers, A. Schmidt, has suggested that the mononuclear cells, being the younger, are the more resistant. It seems to me more natural to infer just the reverse, and to regard the young, newly born elements as tenderer, and the ones likely to be earlier destroyed. In fact, observations on the warm stage tend to show that the polynuclear forms are indeed decidedly more active, exhibiting by far livelier and more pronounced emollient movement. All observers are agreed that the polynuclear leucocytes are pre-eminently the phagocytes of the blood.

As a result of his many experiments, Löwitt found that the sooner the blood was taken after the injection of an agent which gave rise to the phenomena in question, the more marked was the decrease of the leucocytes; and, moreover, the greater proportionately was the decrease of the polynuclear forms—all, of course, within the stage of leucopenia. He was able to prepare the blood for examination in five seconds after the injection.

Having first made a count with the following result:

Leucocytes	9143
Mononuclear, 64.2 per cent.	5869
Polynuclear, 35.8 per cent.	3274

he injected one gram hemialbumose into the veins. A count from the blood withdrawn five seconds after gave

Leucocytes	413
Polynuclear, 4.6 per cent.	19
Mononuclear, 95.4 per cent.	394

Löwitt interprets these facts thus: By the introduction of certain substances into the blood, there is brought about an immediate and complete destruction of the leucocytes. The blood-making organs attempt forthwith to compensate for this total deprivation, and hence is accounted



for the early predominance of mononuclear elements. The few polynuclear forms to be seen at this time are due to the transformation which has taken place—in accordance with Uskow's generally accepted doctrine—from the mononuclear forms. The continuance of this process of transformation is the only way of accounting for the growing number of these, the polynuclear.

To accept Löwitt's explanation, we are obliged to assume premises which scarcely appear to me as probable, namely: That the hematopoietic organs could perceive the want and discharge, even into the most peripheral vessels, the white blood-corpuscles, and that, moreover, some of these, at least, passing through the intermediary stage (transition-forms), become perfectly matured polynuclear leucocytes, with neutrophilic granulations—all in the space of *five seconds*.

At the end of this period of leucolysis, Löwitt has observed, in common with other experimenters, that there begins a rise in the number of the white corpuscles, especially the polynuclear forms, which reaches its height in from five to seven hours after the introduction of the agent. But Löwitt is original in his interpretation of this augmentation, in that he holds "dass die Leucocytose Folge der vorausgegangenen Zerstörung von Leucocyten ist;" that, in other words, the leucolysis and leucocytosis stand in a relation to each other of cause and effect. Such a conclusion is the outcome of simple *post hoc ergo propter hoc* reasoning, the author being influenced by the invariability of the association.

Schulz<sup>22</sup> made certain experiments, from which he was led to believe that the decrease and increase in the blood, as shown by the count, was the result of an unlike distribution of the leucocytes. Having injected 2 cc. bacterial proteins into the right ear of a rabbit, and withdrawn the blood soon after from a vein of the other ear, the number, which previous to the injection he had found 11,100, had sunk to 3300 (stage of leucolysis?). As quickly as possible, with the help of an assistant, the blood from the internal organs was withdrawn for examination with these results: gastric vein, 21,000; renal vein, 20,000; portal vein, 27,000; hepatic vein, 18,000. There was an increase then over the normal, rather than a decrease, for the internal organs at the same time that the peripheral showed a diminution.

Experiments were also made by an English author, Bruce,<sup>23</sup> apparently unaware of those of Schulz, that yielded similar results, though, if anything, the inequality in the numbers of the peripheral organs was still more striking.

These experiments were accepted as conclusive by X. Rieder, than whom there exists no higher authority in hematology. He writes:<sup>24</sup>

As to the origin of leucocytosis, we have upon the ground of experimental examinations no good reason to believe that it is due to an increased supply of white blood-corpuscles from the blood-making organs; still less to an increase of the same in the blood, or to an abnormal collection of wandering cells.

It must be considered as more probable that the leucocytosis is based only upon an insignificant increase of the entire number of the white cells circulating in the blood, in that there occurs an abnormal distribution of the same in the different vessels, in favor of the periphery.

Among other authors who look upon an increase of the white blood-corpuscles as being not an absolute increase of the whole number, but having only a local significance we can mention Werigo,<sup>25</sup> Goldschier and Jacob,<sup>26</sup> Tschistowitsch<sup>27</sup> and R. F. Muller.<sup>28</sup>

Tschistowitsch, moreover, in order further to test the doctrine of Löwitt, made a number of varied experiments to discover whether those substances which were supposed to cause a leucolysis, would effect outside of the body a disintegration of the leucocytes, and his results were all upon the negative side. Goldschier and Jacob also made experiments that were opposed to the hypothesis of Löwitt. Among other things, they were able, by the injection of small and often repeated doses of certain substances, almost to avoid the stage of hypoleucocytosis,<sup>29</sup> and, nevertheless, they saw follow, upon the suspension of the injections, a very intense hyperleucocytosis.

All these authors then, though they differ among themselves, believe together that the increase of the leucocytes observed at one place is compensated for by a corresponding decrease elsewhere, and *vice versa*.

The above, it must be borne in mind, is not to be applied to that augmentation of leucocytes which occurs in leucocythemia (leucemia). Here there is a leucocytosis clearly of another kind than that artificially induced by various chemical agents, and the inflammatory and the cachectic leucocytosis, in that, instead of a predominance of the polynuclear forms seen in the last-mentioned instance, it is characterized by an excess of the mononuclear or young forms. For this reason, and because also we see in leucocythemia elements which are not to be found in normal blood, as Conneil's, Ehrlich's, and the eosinophilic myelocytes,<sup>30</sup> we are justified in considering the leucocytosis of this disease as really arising from a new production of elements. If this be true, we have, on account of this distinction, the more reason for regarding that other kind of leucocy-



tosis, where the neutrophilic polynuclear forms prevail, as not the result of a new production, but arising in some other way.

The question that we have now to consider then, is, what is the cause of the ordinary leucocytosis? If it be the consequence of an unequal distribution of the leucocytes, what is the determining influence?

According to my belief, the key to the whole problem is to be found in the principle known as chemotropismus, or more commonly as chemotaxis. This important principle was discovered by the botanists, Stahl and Pfeffer, in the cells of plants, where it was held by these authors to exercise an influence over cellular digestion and nutrition (therefore the term trophotropismus). Its application to the leucocytes, and especially the phagocytes, has been comprehensively studied by Massart,<sup>11</sup> Bordet,<sup>12</sup> and Gabritschewsky.<sup>13</sup>

Chemotaxis is a peculiar property inherent in the white corpuscles of the blood and the migratory cells, by virtue of which they are attracted toward certain chemical substances or repulsed by them; the phenomenon in the former case being designated positive, in the latter negative chemotaxis. Experiments undoubtedly show that a positive chemotaxis becomes a negative one, if the agent employed be applied in more highly concentrated state.

Römer and others early recognized that leucocytosis ought to be studied in connection with chemotaxis. But without question, the credit for the first clear statement of that connection is due to Rieder,<sup>14</sup> who, as long ago as 1887, at a session of the Academy of Sciences in Vienna, expressed himself in regard to the action of this principle in bringing about leucocytosis as follows:

In the beginning, a great part of the leucocytes circulating in the blood are attracted toward the *locus lesionis*, so that a certain poverty of the circulating blood resulted; after an interval, the agent possessed of chemotactic properties—that is to say, attractive to the leucocytes—entered the blood, where it acted by virtue of those same attractive properties to cause a streaming hither of the leucocytes.

Other authors have placed a different construction on the operation of chemotaxis.

Weigert has spoken of intra- and extra-vascular chemotaxis. Goldschier and Jacob have ascribed the diminution preceding the leucocytosis to a withdrawal of the leucocytes into the capillaries.

R. F. Muller,<sup>15</sup> who made examinations as to this point, found in a number of instances that during the period in which there was a hypoleucocytosis in the blood as shown by the peripheral

vessels, there was a veritable increase in the capillaries of the internal organs. The experiments of Borel<sup>16</sup> also went to show that under similar circumstances there was a marked engorgement in the capillaries of the internal organs, especially of the lungs.

The application of chemotaxis to leucocytosis was very readily accepted by the Metschnikoff school, for the existence of such a property in the leucocyte was an idea quite consistent with its phagocytic characteristics, and subservient to that function. According to the phagocytists, the poisons which entered the system collected first in the abdominal organs, lungs, liver, and spleen. The attraction of the leucocytes to these organs is, then, exactly what should be expected in order to exercise the phagocytic function. So Borel and others have seen, after injection of bacteria cultures, that many of the leucocytes collected in the internal organs contained in their interior those bacteria. One point, however, needs elucidation. Ought not we to expect that the leucocytes would, in the increase and the decrease, simply retain their normal proportion of both forms?

Only Rieder has in any way ventured an explanation on this point, in that he has remarked that perhaps the preponderance of the neutrophilic forms was due to the stagnation of the corpuscles in the vessels, where the process of maturing was allowed to proceed.

Is the explanation not, rather, to be sought in the difference in the nature of the young and the old leucocytes? The polynuclear leucocytes with neutrophilic granulations, being apparently possessed of characteristics which would lead us to expect they would the more quickly respond to chemotactic influences, and being, as hematologists assert, the forms (just as the amphophiles in the rabbit) which are intended by nature to war against germs or noxious agents, is it not natural to suppose, then, that the neutrophilic leucocytes would be those—chemotaxis being the force at work—to appear in the greatest number?

Hankin, having first added some leech-extract to a little blood in a vessel, in order to prevent coagulation, introduced a glass rod. In a little while the blood was almost free of leucocytes, but, withdrawing the rod, he found that it was covered with corpuscles to an extent perceptible to the unaided eye. He did not, however, attempt to differentiate the corpuscles.

In their studies of the action and character of the phagocyte, Everard, Demoor, and Massart<sup>17</sup> introduced small sacs, opened at one end and containing sterilized cultures of bacteria, into the

peritoneal cavity of animals. After some hours the sacs were withdrawn and the contents examined. The results were positive and invariable, in that the leucocytes were almost entirely of the polynuclear variety. The authors were evidently justified from such experiments in concluding that the "polynuclear leucocytes are by far more chemotactic than the others."

Thus is rendered complete the demonstration of the theory of the chemotactic origin of leucocytosis. We can as easily understand, in this light, the disappearance of the polynuclear leucocytes in the stage of hypoleucocytosis, as their reappearance in the stage of hyperleucocytosis; and the observation of Löwitt that the nearer the time of the introduction of the agent, the greater was both the diminution of all leucocytes and the proportion of polynuclear forms, is precisely what we should *a priori* expect, as the expression of greater chemotactic operation.

We must, then, set down leucocytosis as only a local condition, and those agents which give rise to a leucocytosis as agents which effect merely a determination of the white blood-corpuscles from one part of the system to another.

To return once more to the nuclein-therapy, wherein is its *rationale*, if the above view of leucocytosis be the correct one?

According to Prof. Vaughan, the chief advocate of this system of therapy, as well as his followers, if nuclein has any efficacy in the cure of tuberculosis, it is due to its power to augment the number of the white blood-corpuscles. Vaughan<sup>11</sup> concluded an article on "The Treatment of Tuberculosis by Yeast-nuclein" as follows:

I am convinced, especially from my experiments on animals, that nucleinic acid, improperly used, may do harm. It acts, as I have elsewhere shown, by stimulating the organs that elaborate the polynuclear corpuscles, and these may be over-stimulated. Nucleinic acid fails to be of service unless these cell-forming organs respond. They may fail to respond on account of lowered vitality, or they may be paralyzed, as it were, by an excessive dose of stimulant. The agent is not one to be used indiscriminately. Already some physicians are supplying tubercular patients with hypodermic syringes and solutions of nucleinic acid and telling them to go ahead and treat themselves. Such practice as this may make the study of this subject result in misfortune.

As regards the observation of untoward effects proceeding from the administration of nucleinic acid, Vaughan is not alone, for Löwitt has stated that this agent proved in a "high degree poisonous" given to rabbits in amounts of 0.1 per cent. per kilo, causing quickly cardiac and respiratory failure. He is alone, however, so far as I know, in attributing to any organs of the body the func-

tion of elaborating the polynuclear leucocytes, for, as we have elsewhere remarked, modern authorities are agreed in looking upon the polynuclear cell as matured form of the mononuclear, which form of cell only is elaborated directly by the hematopoietic organ.

In another article Vaughan<sup>12</sup> has seen fit to lay some stress on a relationship of uric acid to nuclein. He cites those observations made in regard to an increase of uric-acid excretion after the exhibition of nuclein, and adopts the theory of its formation as a result of the leucocytosis and a disintegration of the leucocytes following.

There are, as Richter<sup>13</sup> points out, not only diseases accompanied by leucocytosis, without an increase of the uric-acid excretion, but also some where this substance is in excess, although no leucocytosis. In cirrhosis of the liver, which Vaughan has cited as an example of the association of uric-acid excess with leucocytosis, there is in reality not only no increase, but according to Klein and others, an abnormally low number of the colorless corpuscles. Vaughan has been equally unfortunate in his illustrations of drugs, supposed both to cause a leucocytosis and an increase of the uric acid. He names antifebrin and antipyrin as such drugs, whereas Horbacyewski<sup>14</sup> himself found these drugs contradictory in this regard, since according to him, although they increased the number of the leucocytes, the excretion of uric acid was diminished.

In conclusion, we shall briefly indicate what we think a fruitful field for future research, whether or not the true solution be found therein. There are good reasons for looking upon the eosinophilic leucocytes as very different and distinct from all the other white blood-corpuscles, not simply on account of their histological character, but also because of their different origin and different function. Neusser, for example, was led to think that they were produced by an irritation of the sympathetic system, and that eosinophilia was, so to speak, a secretory neurosis, in support of which theory he points to some interesting as well as confirmatory observations.

Kanthaack,<sup>15</sup> studying phagocytosis in the frog, after injections of anthrax, made some original observations as to the action of the eosinophiles. He noticed these cells were the first to come and apply themselves to the bacteria, though they did not take them up, the real phagocytes appearing only after an interval. He was accordingly led to believe that the eosinophiles had the function of preparing the particles for digestion, and he thought, although they were non-phagocytic, that

they performed the most important part in the struggle between the cell and microorganism. He suggested that perhaps the oxyphilic granules were of the nature of a zymogen and produced a substance of great chemical activity.

In accord with the idea that some important rôle is enacted by the eosinophile in the process of immunity, Hankin<sup>4</sup> has constructed his theory of the so-called "alexines," which are held to be a defensive substance to whose presence the serum owes its bactericidal property. It exists, according to Hankin, in normal life in the cells, but goes over in the lymph after death. He made certain experiments to discover if there existed a relation between the number of leucocytes and the bactericidal property of the serum, from which it was concluded that such a relation really existed, but that there was not a constant ratio. He believes that he has found by further experimentation, that the eosinophile cells were the source of the property in question, this depending upon the setting free of those cells into the fluid. The latter process, he demonstrated, took place but very slightly in a freshly produced leucocytosis, in which there was but a moderate bactericidal property; whereas it was much greater in an older leucocytosis, corresponding then to a higher degree of bactericidal activity of the serum.

The theory of the alexines or alexocytes was reviewed by Metschnikoff, and this author was disposed to make light of the rôle of the eosinophile in immunity, quoting various other authors who had attached but little importance to this cell in inflammation and infection. But it seems to us, the observation ought to carry little weight, seeing that he followed those authors who placed the normal limit of the eosinophiles at from five to ten per cent., whereas at the present day it is generally estimated to range between one and two per cent.

We had occasion in a former paper<sup>4</sup> to refer to the clinical fact that while measles, a disease in which the eosinophiles were scarce, was often followed by tuberculosis, marked likewise by a tendency toward a low number of those cells; scarlatina on the other hand, where eosinophilia was usually high, was notably seldom so followed.

This has suggested to us that we compare those diseases in which there occurs an augmentation of the eosinophilic leucocytes, with those which clinical experience has shown to be the least often associated with tuberculosis. The latter, that is diseases apparently antagonistic to tuberculosis, are acquired chlorosis, acquired heart lesion, primary essential asthma and em-

physema, primary nephritis, uric-acid diathesis, carcinoma, and echinococcus. Leaving out the cardiac lesion and the carcinoma, everyone of these affections, strange to say, falls in the list of those marked by an increase of the eosinophiles.

This is the more remarkable because that list is not such a very comprehensive one. In addition to those indicated, eosinophilia is a feature only of leucemia, Basedow's disease, osteo-malacia, malaria, intestinal parasites and intoxication, two or three skin affections (pemphigus, pellagra, and lymphoderma perniciosus), and certain functional neuroses, and pneumonia (at the crisis). May we not, if our suspicion be well founded, anticipate that further observations will show the same to be true of all affections in which there is great and constant increase of the leucocytes that contain oxyphilic granules? It is noteworthy in this connection to recall that several authors have seen that Koch's tuberculin would give rise to an augmentation of the eosinophiles.

According to Poehl,<sup>5</sup> immunity is indebted to the existence in the blood and lymph, under favorable conditions, of a substance called "spermin." This is formed by a disintegration of the leucocytes, but only when this takes place in a sufficient alkalinity of the blood do we have a soluble spermin, in which form alone does it possess the power to afford immunity. The latter is due to a proper equilibrium in the process of tissue-change, the greater part of which consists in intraoxidation, and this condition depends upon this soluble spermin. Let it become converted into the insoluble form, which happens in a lowered alkalinity of the blood, then tissue-metabolism, and especially intraoxidation, is so interfered with that there is collected much incompletely oxidized material, accountable according to our author, for all kinds of auto-intoxication. Spermin phosphate is identical with Charcot-Leyden crystals, which were demonstrated by Goulasch to be the crystalline derivative of the eosinophilic cells.

So we again see this most recent of theories to explain immunity, though arrived at by other processes of reasoning and based on other physiological principles, amounts in the end to a quasi-substantiation of the views of Kanthaack, Hardy, and Hankin, as to the significant rôle played by the eosinophiles in protecting the organism against disease.

#### SUMMARY.

We may summarize briefly what has been brought out in the foregoing as follows:

1. Notwithstanding the long-continued conflict as to the importance of the cell and of the lymph



respectively, as the protecting agency of the body, it is probable the claims on each side will be found reconcilable.

2. There is no reason for regarding the leucocytosis, which appears after the introduction of nuclein into the system, as differently produced than that which follows from a great number of other agents, many of which are poisons.

3. Theories of artificially induced leucocytosis, which assume an essential new production of leucocytes by the blood-making organs, are inconsistent with the fact that the blood-making organs send forth only mononuclear cells, whereas in all these forms of leucocytosis the polynuclear are only or chiefly increased.

4. Also, Löwitt's theory of leucolysis and consequent leucocytosis fails to stand the test of experiment or of reason, in the light of known physiological principles.

5. The most rational explanation of leucocytosis is, including the invariable antecedent, leucopenia, according to the principle of chemotaxis. The predominance of polynuclear cells is thereby accounted for in the greater sensitiveness of these forms to chemotactic influences.

6. We must regard, therefore, a leucocytosis as only a local condition; that is to say, only a determination of the white cells into the peripheral circulation, without any real, significant, absolute increase of the whole number of those cells. This view is supported by a number of experiments, which showed that at the stage of leucocytosis as found in the peripheral vessels, there was a coincident decrease in the internal vessels.

7. The leucocytosis produced by nuclein is of this kind. The uric acid found in increased amount in the urine after administration of nuclein may be formed from the nuclein direct and not from the white blood-corpuscles. There is, moreover, no constant correspondence in the number of leucocytes and the amount of uric acid excreted, for there may be leucocytosis without increase of the uric acid, as there may be often an increase of uric acid without leucocytosis.

8. There is some reason for believing that, of all leucocytes, those possessed of the eosinophilic granules play the most essential rôle in protecting the organism against infectious diseases. A suggestive correspondence exists between those diseases which are distinguished by an augmentation of eosinophiles and diseases antagonistic to tuberculosis.

## BIBLIOGRAPHY.

- <sup>1</sup> See for a full explanation—Le thyroidisme et le thyroid-proteidisme et leurs equivalents physiologiques par le Prof. Revilliod, *Revue méd. de la Suisse Romaine*, xv, No. 8, 1895.
- <sup>2</sup> *Centralblatt f. klin. Med.*, No. 29, 1888.
- <sup>3</sup> *Centralblatt f. Bakteriol. u. Parasitenk.*, Bd. x, No. 22.
- <sup>4</sup> "Moyens de défense de l'organisme contre les microbes," *Ann. Inst. Pasteur*, 1893.
- <sup>5</sup> *British Medical Journal*, 1892, vol. i, No. 2.
- <sup>6</sup> "Beiträge zur Kenntniss der Bildung der Harnsäure und der Xanthinbasen." Sitzung d. k. Acad. d. Wiss. in Wien, 1891, Abth. III.
- <sup>7</sup> *Monatsh. f. Chem.*, 1887, p. 624.
- <sup>8</sup> "Ueber den Einfluss des Nucleins der Nahrung auf die Harnsäurebildung," *Berlin. klin. Woch.*, 1895, No. 19.
- <sup>9</sup> "Ueber das Numerische Verhältniss zwischen den Weissen und Rothen Blutzellen," *Müller's Archiv f. Anat. u. Physiol.*, 1895, p. 174.
- <sup>10</sup> "Ueber einige Wirkungen aetherischer Oele," *Archiv f. Exper. Pathol. u. Pharmacol.*, vol. v, p. 109.
- <sup>11</sup> "Ueber den Einfluss von Arzneistoffen auf die Zahl der kreisenden weissen Blutkörperchen," *Archiv f. Exper. Pathol. u. Pharmacol.*, vol. 25, p. 51.
- <sup>12</sup> "Action of Phosphorus, Alkalies, and Quinin on the Globular Richness of the Blood," *American Journal Medical Sciences*, clxxii.
- <sup>13</sup> *Fortschritt der Medicin*, 1888, p. 466.
- <sup>14</sup> *Pflüger's Archiv f. Gesammte Physiol.*
- <sup>15</sup> "Comptes rendus de l'Académie de Science de Paris," vol. 106, p. 1365.
- <sup>16</sup> "Die Chemische Reizbarkeit thierischer Zellen," *Virchow's Archiv*, 1892, p. 128.
- <sup>17</sup> "Farben Analytische Untersuchungen zur Histologie und Klinik des Blutes," *Gesammte Mittheil.*, Berlin, 1889.
- <sup>18</sup> "Ueber den formativen Reiz der Proteines Buchner's auf Leucocyten," *Berlin. klin. Woch.*, 1891, No. 36.
- <sup>19</sup> "Studien zur Physiologie des Blutes und der Lymphe," Jena, 1892.
- <sup>20</sup> In this animal the mononuclear leucocytes constitute approximately one-half the whole number; differing then from man, in whom it is about one-fourth, the average normal number of all white blood corpuscles is in the rabbit, roughly, 10,000.
- <sup>21</sup> Our author might have coined for this *leucopenia*, introduced, I think, by Bieganski.
- <sup>22</sup> "Experimentelle Untersuchungen über das Vorkommen und die diagnostische Bedeutung der Leucocytose," *Deutsch. Archiv f. klin. Med.*, 1892-3; li, 234.
- <sup>23</sup> "On the Disappearance of the Leucocytes after the Injection of Peptone," *Proc. Royal Society, London*, lv, 295.
- <sup>24</sup> "Beiträge zur Kenntniss der Leucocytose und verwandten Zustände des Blutes," *Arb. aus d. Med. klin. Inst. d. k. Ludwig Max. Univ. zu München, Leipzig*, 1893, iii, 182.
- <sup>25</sup> "Les globules blancs, protecteurs du sang," *Annales de l'Institut Pasteur*, 1892, p. 478.
- <sup>26</sup> "Ueber die Variationen der Leucocytose," *Zeit. f. klin. Med.*, xxv, p. 373.
- <sup>27</sup> "Hämatologische Notizen," *Centralblatt f. d. Med. Wissenschaft*, Berlin, 1894, xxxii.
- <sup>28</sup> "Ueber das Verhalten der Leucocytose nach Bacterien-Injectionen," *Inaug. Dissert.*, Berlin, 1894.
- <sup>29</sup> These authors following the French, employed the terms hypo- and hyperleucocytosis, to refer respectively to the diminution and the augmentation of the leucocytes.
- <sup>30</sup> The last-mentioned of these three is probably the only element really pathognomonic of leucemia.
- <sup>31</sup> "Recherches sur l'irritabilité des leucocytes," *Jour. de la Soc. roy. des Sciences med. et nat. de Bruxelles*, 1891.
- <sup>32</sup> "Le Chemotaxisme des Leucocytes et l'infection microbienne," *Ann. de l'Inst. Pasteur*, 1891.
- <sup>33</sup> "Sur les propriétés chemiotaxiques des leucocytes," *Ann. de l'Inst. Pasteur*, 1891.
- <sup>34</sup> Quotation given taken from Löwitt, "Studien zur Pathologie," etc.
- <sup>35</sup> "Ueber das Verhalten der Leucocytose," etc.

<sup>26</sup> "Tuberculose pulmonaire expérimentale," Ann. de l'Inst. Pasteur, 1893.

<sup>27</sup> "Sur les modifications des leucocytes dans l'infection et dans l'immunisation," Ann. de l'Inst. Pasteur, 1893.

<sup>28</sup> MEDICAL NEWS, December 15, 1894.

<sup>29</sup> "The Nucleins and Nuclein-therapy," Trans. Mich. Med. Soc., 1894, xviii, 22-50.

<sup>30</sup> "Ueber Harnsäureausscheidung und Leucocyten," Zeit. f. klin. Med., xxvii, 290.

<sup>31</sup> On the authority of Levison. "Uric Acid Diathesis," translated by Scott, London, 1894, p. 34.

<sup>32</sup> Medical Chronicle, Manchester, N. S., i, 246; ii, 25.

<sup>33</sup> "Ueber den Ursprung u. Vorkommen von Alexinen im Organismus," Centralblatt f. Bakt. u. Parasitenk., vol. ii, 1892, p. 779.

<sup>34</sup> MEDICAL NEWS, March 14, 1896.

<sup>35</sup> "Die Immunitäts und Immunisations-Theorien vom biologisch-chemischen Standpunkt betrachtet," Deutsche Med. Woch., Leipzig u. Berlin, 1895, xxi, 88.

### SURGERY BEFORE THE DAYS OF ANESTHESIA.<sup>1</sup>

By JOHN ASHHURST, JR., M.D., LL.D.,  
PHILADELPHIA.

*Mr. President and Gentlemen of the Board of Trustees and Hospital Staff, Ladies and Gentlemen:* A study of the condition of operative surgery before the days of anesthesia reveals on the one hand a picture of heroic boldness and masterly self-control on the part of the surgeon, and on the other a ghastly panorama, sometimes of stoic fortitude and endurance, sometimes of abject terror and humiliation—but always of agonizing wretchedness and pain—on the part of the unhappy victim, man or woman, whose necessities required a recourse to the surgeon's aid. And from our vantage-ground of a half-century's experience it is difficult for us to understand why it was not until fifty years ago to-day that the crucial experiment was made in this hospital, and that surgical anesthesia became a glorious reality.

It is somewhat difficult to obtain an accurate picture of pre-anesthetic surgery from the patient's point of view, probably for a similar reason to that indicated by the lion in the fable, when he criticized the artist for always representing a combat between lions and men as terminating in a human victory—lions do not paint. So, as operations are habitually reported by surgeons and not by patients, we read of the skill and intrepidity of the operator, of difficulties met and overcome, and of victories snatched as it were from the very jaws of impending defeat; but we hear little of the tortures of the victim under the life-saving process, or, in an unsuccessful case, of the gradual subsidence of agonizing cries hushed in the silence of death. And yet we sometimes catch, incidentally, a side-glimpse of an operation from the patient's standpoint, and can thus form some faint

notion of the shades as well as the high lights of capital surgery in days gone by.

Those who are familiar with the history of British surgery seventy years ago will recall the famous case of "Cooper vs. Wakley," in which the enterprising founder and proprietor of the *Lancet* was sued and mulcted, though in but nominal damages, for the report of an operation for lithotomy performed by Sir Astley Cooper's nephew, Mr. Bransby B. Cooper. The report opens with a quotation from John Bell, referring to "long and murderous operations, when the surgeon labors for an hour in extracting the stone, to the inevitable destruction of the patient," and then, having described in terms as graphic as uncomplimentary, the operator's prolonged efforts to remove the calculus, and the words which showed his own anxiety and discomposure during the process, adds: "Such were the hurried exclamations of the operator. Every now and then there was a cry of 'Hush!' which was succeeded by the stillness of death, broken only by the horrible squash, squash, of the forceps in the perineum. 'Oh! let it go—pray let it keep in!' was the constant cry of the poor man." The patient was on the table nearly an hour, and, after a night and a day of great pain, "death" adds the reporter, "ended the poor fellow's sufferings, about twenty-nine hours after the operation." The fatal result appeared to have been due to peritonitis. It is, indeed, not an unheard-of thing that a surgeon's presence of mind should fail him in a difficult operation even at the present day; but at least the patient, unconscious through the blessing of anesthesia, does not know it, and this complication is spared, to the great comfort of all concerned.

The "pitilessness" which Celsus urged as an essential trait in the operative surgeon—though Percy and Laurent declare that this pitilessness was meant to be apparent only—was, indeed, before the days of anesthesia, a feature in the surgeon's character which impressed very strongly the public generally as well as those immediately connected with the operation; and it may be feared that there are not wanting, even at this nineteenth century's end, some who would echo the comment of the younger Pliny upon the operative surgeons of his time: "They make experiments through deaths, and no head is secured from them."

It is interesting to recall that Sir James Simpson of Edinburgh, shortly after beginning his professional studies, was so affected by "seeing the terrible agony of a poor Highland woman under

<sup>1</sup> Delivered at the celebration of the Fiftieth Anniversary of the first administration of ether in a surgical operation, held in Massachusetts General Hospital, Boston, October 16, 1896.

amputation of the breast," that he resolved to abandon a medical career and seek other occupation; happily his intention was reconsidered, and he returned to his studies, asking himself, "Can anything be done to make operations less painful?" and, as every one knows, in less than twenty years became himself a high priest of anesthesia, and the introducer into surgical and obstetrical practice of ether's great rival, chloroform.

Not only did delicate women and tender children dread the ordeal of the surgeon's knife, but strong and brave men also recoiled from its use in horror: Buffon preferred death to relief from the agonies of calculus by the operation of lithotomy, and case after case is narrated by Monfalcon and other writers, in which men submitted themselves with the utmost calmness and fortitude to the hands of skillful operators, instantly falling into collapse after the first incision, and, without undue loss of blood, quickly succumbing to the depressing effects of simple shock and pain.

No braver or more gallant gentleman ever lived than Admiral Viscount Nelson, and after his right elbow had been shattered by a French bullet in the assault at Teneriffe, he manifested the utmost courage, refusing to be taken to the nearest ship lest the sight of his injury should alarm the wife of a fellow officer whose own fate was uncertain, and when his own ship was reached he climbed up its side without assistance, saying, "Tell the surgeon to make haste and get his instruments. I know I must lose my right arm, so the sooner it is off, the better." "He underwent the amputation," we learn from a private letter of one of his midshipmen, "with the same firmness and courage that have always marked his character." And yet so painfully was he affected by the coldness of the operator's knife, that when next going into action, at the famous battle of the Nile, he gave standing orders to his surgeons that hot water should always be kept in readiness during an engagement, so that if another operation should be required, he might at least have the poor comfort of being cut with *warm* instruments.

But the most striking picture of which I am cognizant, showing the way in which an intelligent patient looked upon a surgical operation, is to be found in a letter written to Sir James Simpson by a friend, himself a member of the medical profession, who had had the misfortune to lose a limb by amputation before the introduction of anesthesia: "I at once agreed," he says, "to submit to the operation, but asked a week to prepare for it, not with the slightest expectation that

the disease would take a favorable turn in the interval, or that the anticipated horrors of the operation would become less appalling by reflection upon them, but simply because it was so probable that the operation would be followed by a fatal issue, that I wished to prepare for death and what lies beyond it, while my faculties were clear and my emotions were comparatively undisturbed. . . . The week, so slow, and yet so swift in its passage, at length came to an end, and the morning of the operation arrived. . . . The operation was a more tedious one than some which involve much greater mutilation. It necessitated cruel cutting through inflamed and morbidly sensitive parts, and could not be dispatched by a few strokes of the knife. . . . Of the agony it occasioned I shall say nothing. Suffering so great as I underwent cannot be expressed in words, and thus fortunately cannot be recalled. The particular pangs are now forgotten; but the blank whirlwind of emotion, the horror of great darkness, and the sense of desertion by God and man, bordering close upon despair, which swept through my mind and overwhelmed my heart, I can never forget, however gladly I would do so. Only the wish to save others some of my sufferings makes me deliberately recall and confess the anguish and humiliation of such personal experience; nor can I find language more sober or familiar than I have used, to express feelings which, happily for us all, are too rare as matters of general experience to have been shaped into household words. . . . During the operation, in spite of the pain it occasioned, my senses were preternaturally acute, as I have been told they generally are in patients under such circumstances. I watched all that the surgeon did with a fascinated intensity. I still recall with unwelcome vividness the spreading out of the instruments, the twisting of the tourniquet, the first incision, the fingering of the sawed bone, the sponge pressed on the flap, the tying of the blood-vessels, the stitching of the skin, and the bloody dismembered limb lying on the floor. Those are not pleasant remembrances. For a long time they haunted me, and even now they are easily resuscitated; and though they cannot bring back the suffering attending the events which gave them a place in my memory, they can occasion a suffering of their own, and be the cause of a disquiet which favors neither mental nor bodily health."

On the side of the surgeon, we find throughout the ages a constant effort to diminish the terrors of operations, and a continuous reprobation of



the distressful, not to say cruel, modes of practice adopted by preceding generations. "Who can read without a kind of horror," cries Monfalcon, "the account of those frightful operations which were then practised? And yet the time is not very far distant from ours, when they lopped off a limb by striking it violently with a heavy knife; that time when they knew neither how to stop nor how to prevent hemorrhage but by burning the part whence the blood jetted with boiling oil or the red-hot iron; that time when surgeons armed themselves at every moment with pincers, with burning cauteries, and with a thousand instruments, the representations even of which cause terror." Will it happen that on the occasion of some future anniversary, our successors will speak of our operative triumphs with the same scorn and abhorrence with which writers of the present day sometimes refer to the great deeds of our surgical forefathers?

The belief that operations might be rendered painless, and the hope that some means might be discovered by which this end should be accomplished, appear to have been present in the minds of surgeons from the earliest periods. Witness the accounts of the Memphis stone, described by Dioscorides and Pliny, which by steeping in vinegar was made to give forth the fumes of carbonic acid; and of the Mandragora, employed according to Theodoric, when mixed with other narcotics, by inhalation, and causing a sleep from which the patient could only be aroused by the fumes of vinegar; so profound was the stupor induced by this drug, that Bodin assures us that under its influence a man submitted without consciousness to a painful operation, and continued to sleep for several days thereafter.

Vigo speaks of the whole body being "brought asleep by the smelling of a sponge wherein opium is," but warns his readers that the practice is dangerous, because the use of opium is sometimes followed by gangrene. In his work on "Natural Magic," Baptista Porta speaks of a volatile drug, kept in leaden vessels, which produced sleep when applied to the nostrils, and Perrin suggests that this may actually have been ether or some other of our modern anesthetic agents.

Others endeavored to prevent the pain of operations by mechanical means. The Assyrians, Hoffman assures us, compressed the veins of the neck, apparently by tying a band around the part, before practising circumcision, and compression of the carotid arteries was suggested as an anesthetic measure in more modern times by Dr. Fleming; while still more recently, Dr. Augustus

Waller has shown that insensibility may be induced by compressing the cervical vagi. Garroters have indeed clearly shown, as remarked by Simpson, that a person may readily be choked into unconsciousness, but it is not surprising that their mode of practice has not commended itself to surgeons for general adoption.

Compression of the limb by a fillet or tight ligature, before amputation, is referred to by Paré as a mode of alleviating the suffering which attends that procedure, and Benjamin Bell tells us that "in amputating limbs, patients frequently desire the tourniquet to be firmly screwed, from finding that it tends to diminish the pain of the operation." The same writer refers approvingly to the suggestion of Mr. James Moore, that pain should be controlled by the application of a screw compressor to the principal nerve of the part, but surgeons generally appear to have agreed with Monfalcon, that the inconveniences of such an apparatus fully equaled its very slight advantages.

Mental preoccupation was sometimes sought as a means of preventing pain. Richard Wiseman found that soldiers dreaded the loss of a limb much less if it was removed immediately, while they were "in the heat of the fight," than if the operation was postponed until the next day; "wherefore," he says, "cut it off quickly, while the soldier is heated and in mettle;" and Renaudin recalls the case of the amiable Dolomieu, who, exposed to the pangs of starvation in a Neapolitan dungeon, measurably alleviated his own distress by engaging in the composition of a treatise on mineralogy, while his unfortunate servant and fellow prisoner, who had not the same intellectual resources, was hungry enough for both.

But the presence of pain was not the only evil dreaded by our predecessors in attempting important operations; the great risk of fatal accident from some involuntary movement of the patient was constantly present to the mind of the conscientious surgeon. "How often," says Dr. Valentine Mott, "when operating in some deep, dark wound, along the course of some great vein, with thin walls, alternately distended and flaccid with the vital current—how often have I dreaded that some unfortunate struggle of the patient would deviate the knife a little from its proper course, and that I, who fain would be the deliverer, should involuntarily become the executioner, seeing my patient perish in my hands by the most appalling form of death! Had he been insensible, I should have felt no alarm." So

greatly was the responsibility of using the knife felt by the best-informed surgeons of pre-anesthetic days that many, like Haller, distrusted their own manual dexterity, and declined to perform operations which, while recognizing as necessary, they felt should be left to other surgeons differently constituted from themselves. Would that a little of this Hallerian diffidence might affect some tyros of the profession in our own day who, without the slightest preliminary practical training, do not hesitate to undertake the most hazardous procedures, and seem to consider themselves disgraced if they cannot count one or more abdominal sections, even if terminating fatally, within the accomplishments of their first year's practice!

Coming down to the days more immediately preceding the date of the great discovery, we find that opium and alcohol were the only agents which continued to be regarded as of practical value in diminishing the pain of operations, though the attendant disadvantages of their employment were, of course, recognized. "Previous to every painful operation," says Dorsey, "a dose of laudanum should be administered." "I was in the habit," says Dr. Mott, "of giving opiates freely before the introduction of anesthetics, both before and after operations, . . . and opium and its preparations are the only anodynes well adapted to surgical use. No substitutes are worthy of confidence." Demme tells of a woman who, under the influence of opium, submitted to amputation at the hip-joint, and emitted but a single cry; and I myself recall distinctly patients who, in the hands of that excellent surgeon, the late Dr. George W. Norris, had limbs amputated with almost no manifestation of pain when saturated previously with opium and whisky. Alcohol, pushed to the point of producing intoxication, was employed as an anesthetic by some surgeons, and Dorsey tells us that Dr. Physick, following Richerand's suggestion, used it successfully for its relaxing effect in a rebellious case of dislocated jaw, in which, on account of the patient's "extreme debility," it was not thought prudent to resort to the usual remedy—"blood-letting *ad deliquium animi*."

Meanwhile facts were accumulating, the significance of which we can now plainly recognize, but which excited no attention at the time. Sir Humphrey Davy had, in the very early days of the nineteenth century, experimented with nitrous oxid gas, afterward employed by Horace Wells, and had, in so many words, suggested its use as an anesthetic in minor operations; its power of

preventing the sensation of pain was well known to many persons, and it was the custom at some of our medical schools, noticeably at the University of Pennsylvania, for students to breathe the "laughing-gas," as it was then called, for diversion. The use of ether by inhalation had been still earlier recommended by Beddoes, Pearson, and Thornton as a remedy for certain diseases of the lungs, and in 1805 your own Warren had employed it "to relieve the distress attending the last stage of pulmonary inflammation." Its intoxicating qualities when inhaled, and its power, when in sufficient concentration to produce stupefaction, had been recognized in 1839, in Pereira's well-known treatise on materia medica, and were quite familiar to American medical students; and it is no doubt possible—I certainly have no wish to deny it—that in isolated cases it may have been used as a means of relieving pain by individual practitioners, as by Dr. Long, of Athens, Ga., whom Perrin, with that happy disregard of the geography of all countries except their own, which is characteristic of French writers, calls the "Greek physician."

But yet—and yet—surgeons went on, in every country, cutting and burning, and patients went on writhing and screaming, until, on the sixteenth day of October, in the year 1846, in the Massachusetts General Hospital, Dr. John C. Warren painlessly removed a tumor from a man who had previously been etherized by Dr. William T. G. Morton, and surgical anesthesia became the priceless heritage of the civilized world.

## CLINICAL MEMORANDA.

### SUCCESSFUL LAPAROTOMY AND KRASKE OPERATION ON AN INFANT TWO DAYS OLD FOR IMPERFORATE RECTUM.<sup>1</sup>

By J. W. ELLIOT, M.D.,  
OF BOSTON;

SURGEON TO THE MASSACHUSETTS GENERAL HOSPITAL.

ON May 1, 1896, an infant two days old was brought to me at the Massachusetts General Hospital, with the history that it had passed no meconium since birth. The child weighed six pounds ten ounces at birth. Examination revealed a perfectly formed anus, which proved to be a blind pouch less than a quarter of an inch deep. The abdomen was distended and hard. The little finger was easily passed into the vagina, but detected no bulging of the bowel.

An incision was made from the anus to above the level of the top of the sacrum. After a few minutes' dissection, it became evident that the lower rectum was entirely absent. The posterior wall of the vagina bulged into the

<sup>1</sup> Reported at the American Surgical Association at Detroit, May 28, 1896.

wound, and was opened in order to inspect its upper end. The coccyx was next removed with scissors, but no portion of the rectum could be found. The lower part of the sacrum was next cut out on the left side, up to about the third foramen, making a regular Kraske operation. The finger was then pushed in just in front of the sacrum to a considerable depth, but the bowel could not be felt. The child was then turned on its back in the Trendelenburg position, and the abdomen opened in the median line. The urachus and the bladder were met lying against the abdominal wall and were avoided.

The lower bowel was found to consist of a greatly distended pouch which filled the abdomen and seemed to spread out over the whole pelvis, but not to enter it. Its distended condition prevented my pushing it down into the pelvis. A trocar was passed in through the sacral wound, and with two fingers in the abdomen to guide, it was pushed into the distended bowel. Gas escaped freely, and as soon as the bowel had collapsed, I was able to push it down in front of the sacrum until it was caught in the sacral wound, where it was opened and stitched to the skin as in a regular Kraske operation. The abdominal and perineal wounds were quickly closed with sutures.

The infant bore the operation remarkably well. Great care was taken to keep it warm. It was fed on modified milk, according to Dr. Rotche's formula.

The temperature rose to 102° F., and pulse, 140. On the fifth day the temperature was normal, and gas and feces passed freely through the artificial anus. The child gained nearly two pounds in the next three weeks, and was discharged from the hospital on the twenty-seventh day in good condition. The wounds had healed rapidly, and the opening into the rectum was large and needed no dilatation.

A letter from the parent, a doctor, three months after the operation, reported the child in excellent health, but the opening into the rectum had required dilatation.

So far as I am able to learn from the literature, the coccyx has been removed several times in searching for the bowel in cases of so-called imperforate rectum. Dr. Conant<sup>1</sup> appears to have been the first to do a laparotomy for the purpose of pushing the bowel down into the perineal wound.

The case here reported, I believe to be the first where a laparotomy was combined with a Kraske operation for the correction of imperforate rectum.

#### REPORT OF A CASE OF TYPHOID FEVER COMPLICATED BY EXTRAUTERINE PREGNANCY.

By JAMES B. HERRICK, M.D.,  
OF CHICAGO, ILL.

I DESIRE to place on record the following case, because of the rare, if not unique, combination of typhoid fever and extrauterine pregnancy.

A woman, about thirty-eight years of age, entered the Cook County Hospital, January 25, 1896, with many of the initial symptoms of typhoid fever—headaches, chilli-

ness, anorexia, malaise, fever for several days, etc. No splenic tumor or rose-spots could, however, be made out at this time, and a diagnosis of typhoid was, therefore, reserved. This reservation was also made, because of the suspicion of a puerperal or *post-partum* septicemia. The patient told us that a few weeks before, being, as she then supposed, three months pregnant, she had taken medicine to bring on an abortion and had, as she believed, accomplished the object. For there had been a discharge of blood with some other material, that she described very indefinitely, but which she thought was the fetus. This continued for nearly three weeks, and then she suffered from the loss of appetite, the headache, the chilliness, etc., that finally induced her to come to the hospital. A fact that she reported, and which, in the light of later revelations was very significant, but to which not enough importance was attached in the making of the diagnosis, was that about this time, *i.e.*, the time of the supposed miscarriage, she had suffered severe abdominal pain, nausea, and had an attack of fainting, with some form of convulsion.

The examination gave the ordinary findings in a fever patient. In addition, there was plainly made out what was believed to be an enlarged uterus, presumably four months advanced in pregnancy. The question of its containing a live or dead fetus, secundines, or a fibroid, was discussed as well as the possibility of its being the source of infection. The absence of odor, discharge, or evidence of local uterine or peritoneal inflammation, with the many indications of typhoid, led to an expectant and non-interfering policy. This was rewarded in a few days by the appearance of rose-spots, and by such enlargement of the spleen as to make this organ plainly palpable. The diagnosis was further confirmed by an intestinal hemorrhage that proved fatal. The urine had shown on all examinations an abundance of albumin with numerous casts.

The autopsy (Drs. Hektoen and Tice) revealed healed apical tuberculosis, old pleuritis, pericarditis, endarteritis, chronic nephritis, and a ureteral anomaly. The findings, to which I call attention, were:

1. *Typhoid fever*.—Typical typhoid ulcers in ileum and colon; enlarged mesenteric glands; splenic tumor; typhoid bacilli in spleen, kidney, and heart's blood.

2. *Extrauterine pregnancy*.—The uterus was slightly increased in size and pushed to the left. Back of the uterus, occupying the middle of the pelvis and rising above its brim, was a globular mass containing a mummified fetus, placental tissue, and an old blood-clot. This mass was bound to the surrounding intestines by firm adhesions. The right tube could be traced for but half the length of the left. Apparently there had been primary right tubal pregnancy, with rupture at the time of the pain and syncope.

I have been unable to find other records of this unusual accidental complication of typhoid fever, and report the case, therefore, because of its rarity. It also teaches the lesson that it is not always wise to resort to operations—even exploratory operations—until the diagnosis is reasonably clear. It is often good practice to wait for hours or days before deciding as to the nature of an illness or the

<sup>1</sup> *Boston Medical and Surgical Journal*, March 24, 1893.



method of treatment proper to be employed. Had operative interference been resorted to, in this case, for the removal of a possible uterine source of infection, death would probably have resulted earlier than it did, and from the effects of the operation. The patient with typhoid and chronic nephritis would have been a poor subject for the surgeon. Had we been more skillful in recognizing the extrauterine pregnancy, the temptation would have been very strong to have looked upon the case as one of infected gestational sac, and clearly suitable for immediate operation. Fortunately, we temporized, and the death cannot be attributed to too zealous or unskilled treatment, but solely to acute anemia following intestinal hemorrhage.

## MEDICAL PROGRESS.

**A New Method of Diagnosis in Typhoid Fever.**—In *La Presse Médicale* (July 29, 1896) WIDAN describes a method used by him as a test for the diagnosis of typhoid fever, which has not failed in eighty cases examined. The test rests upon the action of the serum of a typhoid patient upon young cultures of coli bacilli growing in bouillon. It is performed in several ways. From a finger-tip carefully sterilized by bichlorid of mercury solution and ether a small quantity of blood is drawn into a glass receptacle and allowed to clot. If a few drops of the serum (one for every ten drops of bouillon) are introduced into a young bouillon culture of coli bacilli, these will in a short time gather themselves together into little balls, sometimes visible to the naked eye and always easily noticeable by the aid of the microscope. The reaction may be evident in a few minutes, but is more marked after a few hours. It is desirable to use a culture of the bacilli only a day or so old; but if no fresh one is at hand, another method may be used. A tube of bouillon is sowed with some of the old coli bacilli culture (no fresh culture being at hand), and the typhoid serum is added in the proportion of one drop of serum to three cubic centimeters of bouillon. After twenty-four or forty-eight hours at 37° C. the same reaction described above is discernible. A control tube is recommended, the coli bacilli being omitted as the blood-serum may not be sterile.

**Effect of Ether on the Blood.**—The author of this paper, VON LERBER (Inaug. Diss., Basel, Schweiz. Verlagsdruck, 1896) bases his conclusions on examinations of the blood of 101 patients. One or two examinations were made before etherization, and from two to four examinations afterward.

The quantity of hemoglobin was compared in ninety-eight cases. In sixty-five cases it was the same after operation as before; nineteen times there was an increase, fourteen times a diminution, but in only two instances did this amount to ten per cent., and in these there was great loss of blood at the operation. Ether, therefore, does not affect the quantity of hemoglobin.

The red blood-cells were counted in 101 cases. In fifty-five cases they were increased, in forty-two diminished, and in four there was no change. The gain and loss were in most cases only temporary. So that it

may safely be said that ether has no deleterious influence on the red blood-corpuscles. A spectroscopic examination of the urine in eighty-three cases failed to show any increase in urobilin. This is further evidence that the red blood-corpuscles were not destroyed.

In ninety-six cases the white blood-corpuscles were increased. In five they were diminished. In three of these latter the opening of abscesses (which had caused pathological leucocytosis before the operation) sufficiently explained the decrease in white corpuscles. In one case the decrease seemed due to rapidly approaching death, and in the other case the decrease was insignificant. The author concludes that etherization often occasions a marked leucocytosis.

**Division of the Cervical Sympathetic in Cases of Exophthalmic Goiter.**—JABOULAY (*Lyon Médical*, 1896, No. 22, p. 150) has practised division of the cervical sympathetic nerve in two cases of exophthalmic goiter, with resulting diminution in the prominence of the eyes. Both nerves must be divided, but the result is not always symmetric, as one of the nerves may be larger than the other, and thus capable of more pronounced activity. The operation is believed to be justifiable in accordance with the intensity of the symptom.

**Cæsarean Section Thrice Performed on the Same Patient.**—VAN DE POLL (*Centralblatt für Gynäkologie*, 1896, No. 21, p. 554) has reported the case of a woman whose first pregnancy terminated in the spontaneous delivery of a putrid fetus; the second in the instrumental delivery also of a putrid fetus. In the third labor, after the discharge of a considerable amount of amniotic fluid, the fetus was found to occupy a transverse position, an arm prolapsing. Decapitation was performed and the body of the child extracted. During the necessary manipulations it was found that the pelvic inlet was greatly contracted, but the head was expressed with some little effort. The head and the placenta were in process of putrefaction. Rigid antisepsis was observed, and the puerperium was uncomplicated. Subsequent measurement showed the pelvis to be of generally contracted, flat, rachitic type. The patient was instructed in the case of another pregnancy to present herself for Cæsarean section; and accordingly, about a year later, this operation was performed, the child living, and the only complication being a mild circumscribed peritonitis. Some 2½ years later the woman again became pregnant, and again was Cæsarean section performed, with the delivery of a living child. After an interval of seven years the woman became pregnant for the sixth time. After incision of abdominal wall and uterus a slightly asphyxiated child was delivered and resuscitated. On account of the firm adhesions between the anterior surface of the uterus and the abdominal wall it was decided to remove the uterus by the method of Porro, and a portion of the abdominal wall, which was the site of adhesions, was excised. Continuing hemorrhage from the vagina, after closure of the abdominal wound, necessitated reopening, and a small bleeding vessel was ligated. Other than a slight diarrhea the further progress of the case was uneventful.

# THE MEDICAL NEWS.

A WEEKLY JOURNAL  
OF MEDICAL SCIENCE.

COMMUNICATIONS are invited from all parts of the world. Original articles contributed *exclusively* to THE MEDICAL NEWS will after publication be liberally paid for (accounts being rendered quarterly), or 250 reprints will be furnished instead of payment. When necessary to elucidate the text, illustrations will be engraved from drawings or photographs furnished by the author.

Address the Editor: J. RIDDLE GOFFE, M.D.,  
No. 111 FIFTH AVENUE (corner of 18th St.), NEW YORK.

Subscription Price, including postage in U. S. and Canada.

PER ANNUM IN ADVANCE . . . . .	\$4.00
SINGLE COPIES . . . . .	.10
WITH THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, PER ANNUM . . . . .	7.50

Subscriptions may begin at any date. The safest mode of remittance is by bank check or postal money order, drawn to the order of the undersigned. When neither is accessible, remittances may be made, at the risk of the publishers, by forwarding in registered letters.

LEA BROTHERS & CO.,  
No. 111 FIFTH AVENUE (corner of 18th St.), NEW YORK,  
AND NOS. 706, 708 & 710 SANSON ST., PHILADELPHIA.

SATURDAY, OCTOBER 17, 1896.

## SALINE INJECTIONS.

In a recent number of the *Revue de Chirurgie*, Claissé gives a study of the effects of the subcutaneous injection of saline solutions in man and the lower animals. In view of the rapidly increasing practice of combating certain diseased conditions by the injection of serums, real or artificial, a resumé of the subject is well worth a few moments' thought. The solutions most often employed are such as the following:

Sodium chlorid . . . . .	7 grams
Distilled water . . . . .	1000 grams
Or	
Sulphate of soda } aa . . . . .	7 grams
Chlorid of soda } . . . . .	
Distilled water . . . . .	1000 grams

The solutions are injected at the body temperature. It has been found by experiments upon animals that there is what is known as a toxic rapidity of injection, and if this be exceeded the animal quickly dies; but it has little practical application in man, as this limit could be reached only by the greatest recklessness.

As might be expected, the most satisfactory results have been obtained in cases of exsan-

guination, and clinical and experimental results agree that the injected serum not only supplies in quantity the place of the blood lost, provided the hemorrhage has not been too great, but that it has a decided hemostatic action. The clinical phenomena which follow these large injections in cases of acute anemia or of shock, have deeply impressed those who have witnessed them. Patients who were blanched, cold, senseless, and almost without pulse and respiration, have shown a marked improvement before 100 grams of fluid were injected. With the continuance of the treatment, pulse and respiration became normal, the cheeks regained their color, and the eyes their brilliancy, and consciousness returned. With the injection of 1½ to 2 liters, reanimation was complete, though in several instances it was necessary to repeat the treatment once or twice.

The results of saline injections in infection are none the less interesting, although they are less clearly understood, and the treatment in such conditions has been far less satisfactory than in acute anemia. The clinical observations here have mostly rested on the results in pneumonia and cholera, and such surgical affections as septicemia after child-birth or surgical operations. In a recent article in *La Presse Médicale*, June 17, 1896, Bosc has gone into this part of the subject very thoroughly, and a typical case must here suffice.

Take a patient suffering from a severe infection—puerperal, for instance; all the organs are affected and are working badly, the temperature is about 104°; in ten minutes 1300 or 1400 grams of saline solution are injected subcutaneously. Before half of that amount has been reached, the improvement is manifest. The pulse becomes more regular, fuller and stronger; respiration is deeper and less hurried, and possibly the temperature falls a degree at the end of the injection. The patient feels better, is brighter, and possibly desires to urinate, but not any great amount.

Usually the patient now enters what is known as the *critical stage*, which comes on generally in four or five minutes, though it may be delayed to half an hour. There is a violent chill, with sensation of extreme cold, strong, rapid pulse,

and a rapidly rising temperature ( $104^{\circ}$ – $106^{\circ}$  in the space of an hour). The chill is succeeded in from forty to sixty minutes by a feeling of heat, with flushed face, injected conjunctivæ, and labored respiration. Pulse and temperature are unchanged. Water makes its appearance in quantities through the pores of the skin, the kidneys, and sometimes the intestinal tract.

Three or perhaps four hours later the real improvement becomes manifest, the temperature sinks to normal—often very rapidly—and convalescence is entered upon. In severe cases the improvement is only temporary, and the injections have to be repeated in thirty-six or forty-eight hours. In still other cases the injections have little effect in staying the fatal issue.

Such, in general, are the results of subcutaneous saline injections, corresponding to intravenous ones, except that the latter produce a more marked *critical stage* and a somewhat quicker improvement. What can be said of their mode of action?

1. The mode of action in acute anemia is relatively simple. The gravity of this condition is due to the rapid fall of arterial pressure, the cardiac reflex is imperfectly excited, and the heart contracts irregularly and feebly. As soon as the vessels are filled the heart beats again with its usual force, and the anemia of the nervous centers disappears. The injections produce hemostasis in a twofold way, by exciting the contractors of the torn arterioles, and by the precipitation of hematoblasts, thereby favoring clotting of the blood.

2. In infectious cases the mode of action is still very obscure. It is not a simple mechanical one, by which bacteria and toxins are washed out through the skin, kidneys, and intestine—a “lavage of the blood,” as it has been called. The quantity of fluid used is too small for that, and an actual toxuria has not been proven. No, the action is more complicated.

In infection, all the general symptoms point to an intoxication whose effects are especially evident upon the nervous system. The rapid effect of injections can only be explained by a destruction of the toxins or an almost instantaneous increase in the resisting power of the body. But

the transformation of toxins by the injection of 1200 grams of salt water is problematical, to say the least. Still it has been thought possible, by Chorrin. On the other hand, that the physiological resistance manifests a renewed and intense activity seems more likely.

Phagocytosis undoubtedly plays an important part in the protection of the tissues. It may be that the gravity of infection is due in part to an insufficient activity of the leucocytes. This in turn may be due to hypertoxicity of the blood. Perhaps the salt water reduces this toxicity by simple dilution of the blood, and conveyance to all parts the nourishment necessary for cellular activity, thus renewing the strife between the forces of infection and resistance.

This theory is based on too scanty facts, it is true, but as far as known the results of saline injections are comparable to those of the injection of antitoxic serums—*i. e.*, they produce disintoxication.

If this theory is admitted the explanation of the symptoms which follow is easy. Freed from the influence of the poison the nervous system resumes its action. The increased quantity of fluid and the better nervous action give a stronger and more regular pulse, and the kidneys and skin in consequence resume their functions, and the temperature gradually returns to normal.

The indications for the use of saline injections after profound hemorrhages are absolute, and intravenous injections are preferable to subcutaneous ones on account of their more rapid action. In serious infections (acute peritonitis, puerperal or traumatic septicemia, tetanus, eclampsia), where a temperature of  $103^{\circ}$ , or higher, shows a grave pathological condition, this method of treatment not only ought to be, but should be wisely and judiciously applied in connection with sustaining treatment.

Claissé concludes that “These large injections of saline solution ought to be employed with judgment and prudence, as a very powerful therapeutic resource.” In them we possess an agent which, logical in theory, approved by experiment and clinical experience, is able to give happy results in conditions which have hitherto seemed beyond the resources of medicine.



**THE JUBILEE OF ANESTHESIA.**

THE condition of anesthesia is such a common one that the present generations of surgeons little realize what a priceless boon to humanity its discovery was. It is well, therefore, in the celebration of the fiftieth anniversary of that event, to recall the pre-anesthesia days; and in that respect the celebration in Boston was made peculiarly interesting by the presence there of some of the prominent actors in the surgical arena of that time who were present when the first demonstration was made of the complete anesthetic powers of sulphuric ether. In this demonstration Morton was the prominent figure, and it was largely due to the power of his unalterable conviction that ether could be harmlessly taken to the extent of causing complete unconsciousness during a surgical operation that this great triumph was made possible. It is the act of Morton, therefore, that is rendered memorable by this anniversary celebration.

He it was who, in the Massachusetts General Hospital, on the 16th day of October, 1846, in the face of skepticism and an assemblage of distinguished but doubting observers, dared to administer sulphuric ether to a fellow man, to the extent of rendering him insensible to the incisions made by the surgeon's knife.

There are four claimants to the honor of the discovery of anesthesia—Dr. Long of Georgia, Dr. Wells of Hartford, Conn., and Drs. Morton and Jackson of Boston. The late Dr. Marion Sims proved beyond question that Dr. Long performed one or two minor operations with the assistance of ether, in 1842, but Long did not publish the fact nor did he make known the process to the profession in a way to cause its adoption. Dr. Wells discovered the anesthetic effect of nitrous oxid gas. To demonstrate its efficacy he submitted to the extraction of one of his own teeth while under its influence, and afterward used it for that purpose in his practice of dentistry. Dr. Jackson suggested to Morton that if nitrous oxid gas would obviate pain, sulphuric ether would do it also, but Morton proved it.

It is not to be wondered at, that the honor of a discovery fraught with such inestimable importance to the human race, and indeed to the entire

animal kingdom, should be sought by everyone who had the least claim to the distinction. Every great discovery is gradually led up to by a series of experiments or preliminary discoveries. An abstract truth is of importance because of its possibilities of practical beneficial application, and to the discoverer belongs due credit, but the man who conceives of and demonstrates the practical application, and so confers the blessing on humanity, deserves the greater honor. This seems to have been the fortunate rôle that Morton played in this great discovery.

Boston has the proud distinction of being the scene of this momentous act, and the nations of the earth recognize that to America belongs the honor of giving anesthesia to the world.

**THE NEW YORK LUNACY LAW.**

THE lunacy law which passed the New York Legislature last winter, and which has recently been put into execution, does not seem to be the "gladsome light of jurisprudence" that was expected. Its workings, and especially its shortcomings, were made the special subject of discussion by the New York Neurological Society at its meeting, October 6th; a general expression was asked for and it was given. The consensus of opinion seemed to be that the law had not only failed to accomplish what its instigators and framers promised, but that serious difficulties, in the temporary disposition of violent patients had been interposed by the long and tedious formalities of the new plan of commitment. The lack of any provision for the care of patients, subject under the previous law to the five-day commitment on the certificates of two physicians, without judicial attestation, also presents a most serious objection.

With this exception it was clear that the physician who acts as examiner in lunacy has very little grievance against the new requirements. It is true, the additional formality which the law now imposes may consume more of his time for its satisfaction than did the previous method of commitment, but he will probably require no instruction to make an additional charge to the patient for this increased service. As a matter of fact, it is the patient and the patient's

family on whom the strictures of the law, some of which we believe unnecessary, weigh too heavily. The physician is concerned only in so far as he is responsible to himself and the friends for the patient's welfare, until such time as the commitment papers can be obtained. Under the existing conditions he has only to examine the patient and certify that in his opinion the patient is insane, and if we mistake not the papers can then be handed to an attorney, who will attend to all the rest of the formality without the physician's presence, even without the latter's appearance before the judge who makes the commitment.

It was made clear by one of the speakers that in the case of the pauper insane of this city it was impossible to satisfy the requirements of the law in reference to the petitioner, for many of these patients are without family or friend to pray the court that such an examination be made, and that in reality this stipulation must either be evaded, or the work must fall upon the city examiners, of whose duty it is not a part.

There exists, therefore, the greatest urgency for the amendment of this law, to the effect that the insane may be cared for until the necessary amount of red tape is unrolled to carry them to a permanent haven. We sincerely hope that the committee, which the Neurological Society has made provision for under the adopted resolution, will leave no stone unturned in the praiseworthy efforts to secure such an amendment to the law, which shall be directly contributory to the welfare of the patient, of his neighbors, and property, during the interim between the time of certification and the commitment. Our advice is that all their energies be directed to that effort alone, and that the matter of the petitioner, of the taking of additional testimony, of appeal, etc., which the new law provides for, be disregarded. If these are defects, their consequences are not serious, and they will succumb through the process of evolution to the exigencies of circumstances.

## ECHOES AND NEWS.

**Dr. Peabody Better.**—Dr. George L. Peabody of New York, who was stricken with a severe attack of appendicitis at Gaspé, Canada, and operated on by Dr. Shepherd of Montreal, is now convalescent.

**The Brooklyn Naval Hospital.**—Secretary Herbert has adopted the plan submitted in competition by Smithmeyer, the designer of the Congressional Library, for the new ward of the Brooklyn Naval Hospital.

**Queen Victoria's Eyesight.**—An oculist named Pagenstecker says that Queen Victoria is suffering only from the natural effect of advancing years, and has made her some new glasses with which she can read and write about as well as ever.

**The Bubonic Plague at Bombay.**—From October 2d to October 7th there were ninety-seven fresh cases of bubonic plague at Bombay, and there have been 276 deaths. A quarantine against Bombay has been declared at Aden and Egyptian ports.

**Against Restriction of Animal Experimentation.**—The American Association of Obstetricians and Gynecologists at their session in Richmond adopted a resolution protesting against the proposed legislation by Congress restricting animal experimentation in the District of Columbia.

**A Newly Discovered Constituent of the Blood.**—Dr. Müller of Vienna has described certain particles found in the blood under the name of hæmokonia (blood-dust). They resemble fat-globules, and the largest are  $\frac{1}{80000}$  of an inch in diameter. They are motile and are unaffected by osmic acid.

**No Foreign Titles for Dentists.**—A dentist has been arrested and fined in Berlin for displaying upon the door of his office a plate describing him as a doctor of dentistry from an American college. The court held that it was against the law for him to use a foreign title in practice in Germany.

**Hospital Sued for Alleged Negligence.**—Suit has been brought against the New York Post-Graduate Medical School and Hospital to recover \$25,000 damages because of the death of a woman, which her father's attorneys allege was due to gross negligence and improper treatment by the hospital surgeons and attendants.

**Southern Surgical and Gynecological Association.**—The ninth annual meeting of the Association will be held in Nashville, Tenn., Tuesday, Wednesday, and Thursday, November 10, 11, 12, 1896. The Nicholson House has been selected as headquarters of the Association. The program promises an interesting and instructive meeting.

**Pruritus Vulvæ in the United States.**—*The Medical Press* says that everyday gynecological practice in Great Britain does not reveal pruritus vulvæ as a common or intractable affection, so that an explanation of its greater incidence on the other side of the Atlantic must be sought in ethnological or climatological peculiarities, unless there are more individual reasons associated with the prevalence of a highly strung, quasi-neurotic temperament.

**The New York Milk Supply.**—The inspection of the milch-cows which are kept within the city limits of New

York discloses a large percentage of tuberculous animals. The tuberculin test has been applied to 308 cows, and 52 of these, or nearly 17 per cent., have been found to be diseased. In one herd of 34 cows, the milk from which was sold to about 200 families, 11 were shown to be "consumptives;" in another herd of 12 there were 8 "consumptives," and the milk had been sold to 125 customers in the northern part of the city.

**Health of the U. S. Army.**—Surgeon-General Sternberg in his report for the year ended June 30, 1896, says: "All the rates that are usually considered by statisticians as throwing light on the physical condition of a community have been lower than in any previous year of the recorded history of the army. The number constantly sick was 35.89 per thousand of strength, as compared with 31.19 during 1894, and 41.59 as the average annual rate of the preceding ten years. The mortality rate from all causes was 5.16 per thousand of strength, as compared with 6.69 in 1894, 7.85 for the preceding decade, and 6.33 in 1889, the year of lowest record."

**Drunkness and Unprofessional Conduct.**—The Medical Board of Oregon was recently called upon to decide what constitutes unprofessional and dishonorable conduct on the part of a physician, it being a duty of the board in its legal province to revoke the license of any practising physician guilty of "moral turpitude." It was established that a physician may get drunk and indulge in loud language occasionally without his conduct being held to indicate moral turpitude. On this point the board agreed with ex-United States Senator Dolph, who appeared as counsel for the accused physician, and who held that getting drunk was only a violation of a city ordinance, and, even when frequently repeated, did not involve any inherent baseness of character.

**A Double Water Supply for London.**—The *Lancet*, of August 29th, refers to a recent law called the "London Sea-water Supply Act," and urges that the construction of necessary works be begun at once. The enterprise is in the hands of a private corporation, whose primary object appears to be the introduction of sea-water for bathing purposes. The *Lancet* holds that its application will not be allowed to stop there, and that the water will be used in watering the streets, a duty that is very much in arrears, and especially noticeable by American tourists—and for other sanitary purposes. The *Lancet* regrets that the proposed intake of water is only a short distance removed from the outlet of the Worthing sewerage system, and maintains that care should be taken to get a sea-water supply that shall be free from contamination by sewage. As to the use of sea-water for household sanitary purposes, all that the *Lancet* has to say is, that it seems absurd to use one and the same water supply for drinking and flushing, and points out the enormous saving in potable water—at all times now so lamentably scanty in London—if sea-water can be utilized for sanitary purposes.

**Chicago's Water Supply.**—Mayor Swift of Chicago has been authorized to select three eminent engineers who will report a plan for constructing intercepting sewers,

whereby the sewage, now poured into the lake where it contaminates the water supply, will be diverted to the drainage canal. The percentage of increase of typhoid thus far in 1896 is 71 in excess of that in the corresponding period of 1895. This is very nearly the death-rate per 10,000 of population of the year 1889, immediately preceding the typhoid fever epidemic of 1890-'92. The present proportion of deaths from typhoid fever is 3.17 per cent. of the total from all causes. In 1889 it was only 2.67 per cent. Health Officer Reilly pointed out to the Council that the legal value of human lives sacrificed to typhoid fever in Chicago during the past twelve months amounts to \$3,750,000. The actual money cost of medical treatment, etc., of the cases will easily raise the sum to \$5,000,000. In Duluth suit has been brought against the city water company by a wife for the death of her husband. She alleges that impure water caused his death. If she recovers damages, Dr. Reilly asked, what precedent might not her success furnish for suits against the city of Chicago?

**Chelidonium Majus in Cancer.**—Dr. Denisko of the Hospital at Briansk, has, it is alleged, obtained some remarkable results in the treatment of carcinomatous tumors by means of a preparation of great celandine (*Chelidonium majus*). He prescribes from twenty-three to seventy-five grains of the extract, to be taken daily in water or peppermint water, and, in addition, injects into the substance of the tumor, near its circumference, a mixture consisting of equal parts of the extract, water, and glycerin. At each sitting fifteen drops are injected altogether in several insertions. Moreover, the surface of the tumor, when ulceration has commenced, is painted twice daily with a mixture of one or two parts of the extract and one of glycerin. The patients usually bear the internal administration of the drug well, and the outward applications cause but very little smarting. The injections, however, in addition to local smarting, cause a sensation of languor, rigors, and some pyrexia, these phenomena commencing about a quarter or half an hour after the injection. They disappear entirely before the next day. Caution is, however, necessary, and the doses have to be suited to the idiosyncrasies of the patient. In a very few days the sallow discoloration, constantly seen in the skin of cancer patients, disappears and the tumor becomes softer. After four or five days small fistulae begin to show themselves where the needle has been inserted, and around these the tumor gradually breaks down. In from fifteen to twenty-five days there is a complete zone or line of demarkation between the healthy and the cancerous tissue, the tumor decreases to half its former size, and any neighboring glands that may have been affected return to their normal condition. It should be clearly understood that the results alleged above are those claimed by Dr. Denisko to ensue on the treatment. We wish this to be made absolutely clear because, in the case of a disease which has hitherto proved to be so intractable to treatment by drugs as has cancer, we think it is wicked to raise false hopes in the breasts of sufferers and their friends.—*London Lancet*, August 29, 1896.



## CORRESPONDENCE.

## A PROTEST.

To the Editor of THE MEDICAL NEWS:

SIR: My name has been recently coupled with a recommendation of a certain patented disinfectant. This has been done in the newspapers and also in some of the medical magazines. I wish hereby to protest emphatically against any such use of my name. It has been done without my knowledge or consent.

Respectfully,

B. MEADE BOLTON.

BACTERIOLOGICAL DIVISION OF THE BOARD OF HEALTH.  
Philadelphia, Pa., October 6, 1896.

## SPECIAL ARTICLE.

## TYPHOID FEVER AT LEAGUE ISLAND NAVY YARD.

REPORT OF A SPECIAL COMMISSION OF INVESTIGATION INSTITUTED BY "THE MEDICAL NEWS."

A FEW weeks since the public of Philadelphia was surprised to read in its daily press the statements, bearing official stamp, that League Island, for some time occupied as a naval station by the United States Government, is regarded by the department as unsanitary and a menace to health. Surgeon-General Tryon of the Navy has in several reports mentioned the bad sanitary conditions at the island, and indeed it would seem, from his report to the department, dated August 31, 1896, that in his opinion typhoid fever is almost endemic there. The "Massachusetts," commissioned at League Island in the past summer, had directly afterward several cases of typhoid fever among her personnel. I copy the following extracts from the report of Surgeon Seigfried of that ship:

"... we have this day (August 31, 1896) transferred to hospital our fifth case of typhoid fever since going into commission at League Island Navy Yard, June 10th.

"... the 'Indiana' which ship also commissioned at League Island, and in the following few months having had sixteen cases of typhoid fever (my informant being one of her medical officers), it is apparent that this matter of infection of new ships taking place at that station should be properly characterized and abated.

"... very palpable and general sanitary evils and nuisances are evident at League Island, and particularly its approaches in one direction, extending for several miles on a direct road to the city. These evils are not readily or soon remediable and it is impossible for the personnel, whether ashore or on liberty, to avoid wholly the dangers of the city's water supply and sewerage difficulties, not to speak of the milk and fresh vegetable supplies. Our ship left the Delaware on August 5th. I recommended that fitting out of new ships at League Island be avoided until that section can be characterized as being clean and without its present uncivilized surroundings.

"In the summer of 1890 the United States marines at League Island experienced almost an epidemic of typhoid (my informant being one of their officers), and the 'In-

diana's' experience following her commissioning there only last year was deplorable."

Following this Surgeon-General Tryon made a report to the department from which I extract these statements: "Results of recent investigations just received, relating to origin of cases of typhoid appearing on vessels in the vicinity of Philadelphia, corroborate the statement contained in the report of the surgeon of the 'Massachusetts.'" "Four cases appeared on board the 'Bancroft' during this summer's cruise, and Past-Assistant Surgeon McCormick, in a carefully prepared report and after thorough inquiry into possible sources of contamination, states he thinks it more than probable that the origin of the fever in the four cases was traceable to the drinking-water in Philadelphia, the water supply of which city is from the Schuylkill River which represents the drainage from a densely populated valley." "He further states that in his opinion the fever could not have originated from causes within the ship, the hygienic condition of which has been excellent throughout the cruise. In view of these facts there is little doubt of the origin of the disease, and that it is unavoidable so long as the present conditions exist. Unless there is decided improvement in the sanitation of this locality, naval vessels should be commissioned elsewhere if practicable."

While, in the majority of instances, it is exceptionally difficult to locate definitely the precise source of infection in an outbreak of typhoid fever, it is, I believe, generally conceded that in most cases the water or food supply is at fault; that there must be some manner of conveying to the human gastro-intestinal tract the specific germ of the disease, and that the medium generally selected is the water. Given one case of typhoid fever, especially of the ambulatory variety, situated in a group of men of necessity limited to crowded quarters, and it is easy to see how this one case, even under the usual sanitary precautions, may become the starting-point of an after-coming outbreak of the disease.

Without the sympathy and coöperation of the Navy Department a scientific demonstration of the sanitary conditions existent at League Island is, of course, impossible; but in view of the great importance, from a commercial as well as from a scientific standpoint, which the subject bears, a few facts and some semi-official information upon the matter may be of interest.

From its situation at the confluence of two such great rivers as the Delaware and the Schuylkill it might readily be supposed that League Island is an alluvial deposit; but though the island has a top stratum of alluvium, as shown by borings, it is actually a part of the main land, separated only by a narrow channel, which has been greatly deepened by dredging in late years. For over 150 years before its occupancy by the United States Government the island was laid out in fine farms, upon which grew dry meadow grasses, and from which came bountiful and unfailing crops. During that time, as now, its area of about 500 acres was protected from the water of high tides by embankments of earth and stone. Some idea of the fitness of its conditions for the purposes of a navy yard may be gained from the following extract from

the report of a commission of five United States naval officers, high in rank, appointed by the President in 1867 for the purpose of investigating the island and its surroundings. The commission "entered into a thorough personal examination of League Island and bestowed its careful consideration upon the relation of all the various points and details involved to present and future wants and purposes of the Navy of the United States, and, in respect to its adaptation for all purposes whatever, this board does not hesitate to recommend with entire unanimity that League Island be held for naval purposes by the United States." In 1864, Mr. Geo. Davidson, of the United States Coast Survey, conducted an investigation and made borings at League Island, and this report to the department contains the statement that the land is high enough for good drainage, and that the island had upon it about 250 large trees, some of which he estimated by cutting to be about 150 years old. His conclusions from borings made all over the island are as follows: A surface soil averaging about  $3\frac{1}{4}$  feet over the entire island; this is stiff, yellowish, clayey material. Beneath this is a stratum, with an average depth of twenty-five feet, of very fine sand, laminated with dark, clayey material, and under this a stratum of coarse sand, gravel, and boulders. It was Mr. Davidson's opinion that with such materials no piling would be necessary for buildings of the heaviest description.

The island was accepted by the Government in 1868, but building to any extent was not begun till 1873. It was found necessary to fill in the ground to be occupied by the buildings, and accordingly this has been done as was needed, and at present the entire part of the island upon which stand the heavy shops of the yard is of made ground. Work is being carried on now toward filling in a large area at the northern part, just east of the main road. The natural advantages of the island in special adaptation for the purposes of a naval yard are very great, in that it is surrounded by a body of water which is never even brackish, and which has sufficient depth for vessels of the largest size; that it is situate near the great coal and iron centers; that it can easily get supplies of men from a great city, and that it is difficult of access to a foreign nation.

From the Report of Surgeon-General Lyon for 1893 I take the following: "The general health of the island has been fair. The water supply is insufficient and dangerous. The Back Channel water is contaminated by the sewage from Philadelphia. The houses of the officers are very unsatisfactory in winter."

With these facts in mind I visited League Island, October 8th, for the purpose of determining officially or unofficially the existing conditions as far as possible. The barracks was situated on the main land upon the bank of the Back Channel, east side of Broad street, and have as a water supply for drinking and culinary purposes rain-water, which is collected from the roofs in five large sheet-iron tanks, entirely covered except for cap-protected man-holes for the water spout and for cleaning the tanks. The tanks appeared to be in good condition and there seems to be no reason why this water should not be

as good as any water collected in clean cisterns or tanks. There is a driven well at the back of the barracks, but I was assured that this water was considered unfit for use and never used. I secured two bottles of the drinking-water which I drew directly from the tank in daily use by the marines. It had a pleasant taste; was clean, sweet, and odorless. The following is the result of an analysis of the specimen for chlorin and ammonia, which shows that these exist in proportions beyond the limit of waters characterized as "impure." For the purpose of comparison I give in connection with this the proportions of the same contaminations in the waters of New York, Boston, and in the Delaware and Schuylkill Rivers, as determined by Dr. J. H. Wright of Harvard.

RESULTS IN PARTS IN 1,000,000.

	Chlorin.	Free Ammon.	Alb. Ammon.	
New York.....	2.31	0.008	0.095	.....
Boston .....	3.70	0.005	0.161	.....
Schuylkill.....	4.06	0.025	0.112	.....
Delaware.....	2.40	0.031	0.130	.....
Specimen from tank at Bar- racks of L. I. }	85.245	0.358	0.1415.	Chemically Impure.

As to the source of contamination of this water, evidently very impure, chemically, I can only form conjectures. The iron tanks, in which it is collected, are in apparently good condition, but are sunk in the ground within six inches of their tops, and may be faulty in construction, letting in contamination from the outside. Such relatively large quantities of chlorin and ammonia are, of course, only indicators of the quality of the water, of which, it would seem, a careful analysis, chemical and bacteriological, is imperative.

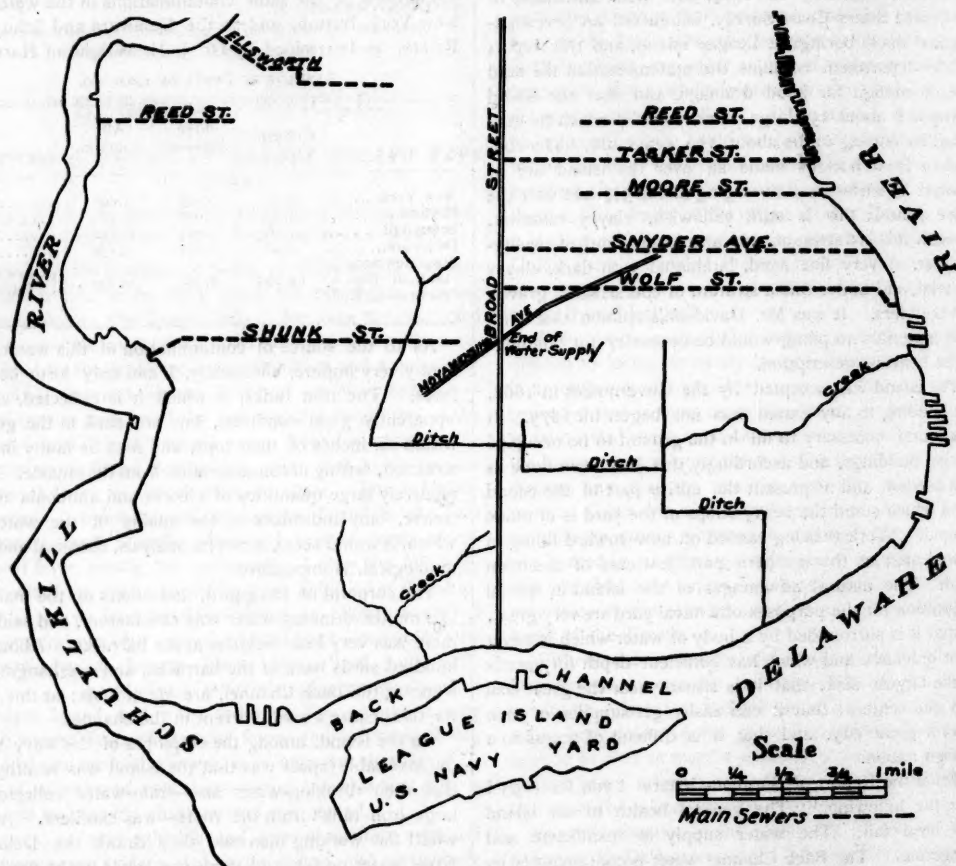
The corporal of the guard, and others of the marines, told me the drinking-water was satisfactory, and said that there was very little sickness at the barracks. About one hundred yards back of the barracks, and overhanging the water of the Back Channel, are the urinals; at this point the tides cause a swift current in the channel.

On the island, among the employés of the Navy Yard, the invariable report was that the island was healthy and that their drinking-water also—rain-water collected in large iron tanks from the roofs—was excellent. At the wharf the working men said they drank the Delaware River water on very rare occasions, while in the dry dock, when dry, a spring of water gushes through the timber flooring, but this, as one of the officers informed me, is considered to be due to the pressure of the water outside the dock, and the spring-water is of such disagreeable taste as to be unfit for drinking purposes. Upon the recruit-ship the water used for drinking and culinary purposes is condensed from the boilers. In the summer time, I was told by an officer of the ship, occasionally water was furnished this ship by a supply-boat from Philadelphia, but such water is never accepted until tested and approved by the surgeon of the ship. The drinking-water supply of ships stationed at the island is from the condensing tanks of these ships. The large

machine-shops and the houses of the Captain and Surgeon of the Yard are provided with large tanks for collecting water, as are also the few farm-houses upon the island. There are no wells upon the island, though at the present time an artesian well is being sunk, the intention being (as one of the officers informed me) to go to the depth of 800 feet. The iron staging for a large tank of the capacity of 30,000 gallons is in process of erection near the artesian well, and from this source water will be conducted to all parts of the island. There is a system of pipes running near the buildings and into these water

complement of about 350 men, officers and employés, they have little sickness on the island; that they average from ten to twelve cases of malaria in the year, while there has been only one case of typhoid fever on the island since 1890, and that the typhoid cases of the "Massachusetts" were undoubtedly imported from other ships or stations.

The accompanying map, which is drawn to scale, shows the relation of League Island to the southern portion of Philadelphia, which is called the "Neck," and is a district very sparsely populated. Here it will be noted that the city's water supply extends no farther southward



Plan of the lower portion of Philadelphia, showing sewage system of that portion of the city, the nearest point of the water supply, and the relation of these to League Island.

can be pumped from the Delaware River for fire purposes, flushing the sewers, etc. The Captain of the Yard, Ship's Surgeon, and the other officers, with whom I talked, received me very courteously, but regretted that a regulation of the Department would not permit them to discuss the question with me. However, incidentally in conversation with them I learned, in addition to the facts I have enumerated, that the island is considered to be an ideal place for the location of a naval station; that the drainage system is fairly good; that with an average

(toward League Island) than the junction of Broad street and Moyamensing avenue—a distance of over two miles from League Island—and at about this point also is the southern limit of the city's sewers, while the sewers empty into the rivers on either side at a distance above League Island very considerably greater than two miles. The large portion of the Neck is on a level below that of the high-tide mark, and is protected from inundation by embankments at the river edge. The water in the ditches and creeks rises and



falls with the tides, and though the ditch-water is often used for cooking purposes by the residents, the main source of drinking-water in this portion of the city is from tanks of rain-water.

The health of the community is remarkably good. Dr. Wm. R. Read of 1403 South Broad street has been in practice twenty-five years and attends a number of families in the southern portion of the city. He has never seen a case of malaria or typhoid in the Neck. Dr. G. H. Meezer, 1425 South Broad street, in a practice of twenty years, says he has never seen a typhoid case anywhere near League Island, while malaria is rare in that district. Dr. C. A. Usilton, Ninth and Dickenson streets, has had a large practice in lower Philadelphia since 1882, and has never seen a case of typhoid fever or malaria in the district. These three gentlemen consider it a very healthy locality, with some remarkable cases of longevity. In their belief, the cases of typhoid occurring on board the ships stationed at League Island were undoubtedly imported.

Surgeon Seigfried, in his report, makes reference to an epidemic state of typhoid at the island in 1890. Although the annual reports of the Surgeon-General of the Navy have for a number of years been most meager as to details of sanitary conditions, I find this in the report of 1890: "All navy yards and stations: Febris enterica, five cases; three sent to hospital; no death."

The report of 1893 says of League Island: "General health, fair. During June and July there was an outbreak of diarrhea at the barracks, which, however, quickly subsided. The cause was probably heat and humidity, for people living outside the yard were similarly affected." Perhaps the surgeon of the "Massachusetts" had reference to this year, instead of 1890.

In conclusion, and in absence of accurate scientific data to the contrary, I think it reasonable to believe that League Island is in a very fair condition as to health, and that if typhoid cases appeared upon the ships stationed at the island, they were brought there from some less healthy locality. One supreme drawback to the island as a naval yard or station is, I am told, its inaccessible position in relation to Philadelphia. It is about four miles from the heart of the city, and, as the "busses" which run during the day stop at 7.00 P.M., the traveler bound for the island after that hour, whether on business or pleasure bent, must take a cab or walk.

HERBERT R. GOODRICH, M.D.

PHILADELPHIA, PA.,  
October 12, 1896.

## SOCIETY PROCEEDINGS.

### AMERICAN ASSOCIATION OF OBSTETRICIANS AND GYNECOLOGISTS.

*Ninth Annual Meeting, held in Richmond, Va., September 22, 23, and 24, 1896.*

#### FIRST DAY—MORNING SESSION.

THE Association met at the Jefferson Hotel, and was called to order at 10 A.M. by the President, DR. JOSEPH PRICE of Philadelphia.

After the usual preliminary exercises, the reading of papers was proceeded with.

JOHN M. DUFF, M.D., of Pittsburg, read a paper entitled

#### PELVIC DISEASES AND THEIR PRINCIPAL CAUSES; WHAT SHOULD THE LAITY BE TAUGHT CONCERN- ING THEM?

That at this day, through mistaken diagnosis, operations are sometimes needlessly performed, no one would have the hardihood to deny; but that such cases are as frequent as some critics say they are, he could not believe. The true pelvic surgeon was governed by nobler purposes, by more elevated aims. Conservatism in its true sense—the saving of life, relief from pain, the curing of the patient, was his watchword.

WALTER B. DORSETT, M.D., of St. Louis, followed with a paper on

#### DECEPTIVE SIMILARITY OF SIGNS AND SYMPTOMS OF INTRA-ABDOMINAL DISEASE, WITH CASES.

The exploratory incision should not be regarded as an evidence of ignorance, but as a legitimate means of diagnosis, and the off-hand diagnostician or the surgeon who never makes mistakes should be looked upon with at least a grain of suspicion. Three interesting cases were reported, one of which is here given:

Mrs. M., aged twenty-eight, married eight years, no pregnancies, was seen by him about a week after having recovered from an attack of malarial fever. Temperature, 99°; pulse, 90; tongue slightly coated and a tendency toward diarrhea. Complained of general abdominal tenderness. Palpation of abdomen revealed a slightly more tender spot at McBurney's point; no swelling or tumefaction could be felt. A vaginal examination revealed a retroversion with fixation; no tubal enlargement nor tenderness could be made out; no vaginal discharge. Diagnosis: Gastro-intestinal irritation, with chronic inflammation of pelvic contents. Diarrheal mixture was prescribed, and patient was told that further attendance would probably not be necessary. Four days subsequently the temperature was 99.8° F.; pulse, 100. Abdominal palpation revealed a distinctly tender spot, with some swelling, at McBurney's point. Patient stated that she had eaten heartily of Wienerwurst the day before, and had been awakened during the night by cramps at the navel. Bimanual examination was again resorted to, with negative result. Appendicitis was diagnosed at this visit (first stage). Dram doses of salts were prescribed, and patient was urged to go to the hospital, but refused. The next day she was seen, and found sitting in a rocking-chair; and, aside from slight tenderness over abdomen, was feeling quite comfortable. Salts had acted freely. Bimanual examination again gave negative results. Temperature, 99°; pulse, 100. Patient was ordered to bed and advised to keep quiet. The case was regarded as better, and thought to be out of danger. The following day the pain became more severe, and the patient came to the hospital of her own accord. Upon examination, the right iliac fossa was found to be exceedingly tender and fluctuating. Vaginal examination revealed nothing.

aside from what was found at the previous examination. Temperature, 103; pulse, 130. Diagnosis: Ruptured appendiceal abscess. She was anesthetized and placed upon the table, and a section made in the median line. The large sac was found on the right side, filled with fluid blood and clots, and when washed out, a rent of the posterior layer of the broad ligament was found, which communicated with another rent in the Fallopian tube. Appendix appeared healthy, and was not disturbed. A thorough washing out of the sac was done and ligation of the tube, with a portion of the broad ligament. A glass drainage-tube was introduced. Notwithstanding the utmost care, the temperature remained high, pulse became worse, the abdomen became distended, and patient died on the third day. Post-operative diagnosis: Ruptured tubal pregnancy, without the usual symptoms. There was no history of shock, no cessation of menstruation, nor nervous symptoms of pregnancy. No passage of decidua, no vaginal discharge of any kind, but in its stead a good history and train of signs and symptoms of inflammatory disease of the appendix.

RUFUS B. HALL, M.D., of Cincinnati, Ohio, read a paper on

#### THE MOST POTENT CAUSES OF PELVIC INFLAMMATION.

He claimed that septic infection, following labor or abortion, or gonorrheal infection, was the cause in almost every instance. The most frequent cause, he believes to be gonorrheal infection conveyed to the woman from a latent gonorrhea of her husband. The more he sees of the ravages of gonorrhea, the more he is convinced of the fact that the profession is derelict in its duty to its patients in the dissemination of knowledge upon this subject. He has, on many occasions, been compelled to remove suppurating tubes and ovaries from women who had contracted the disease from husbands who believed themselves well when married. He has no hesitation in asserting that gonorrhea is more destructive to women than syphilis. No man has a right to marry until the irritating injections show the absence of gonococci in the discharge—frequently a period of two years after the beginning of acute symptoms—otherwise he will certainly infect his wife. If the profession would advocate and practise this doctrine, we would right many of the existing wrongs inflicted upon innocent women.

Dr. Hall is a firm believer in legislation upon this subject. He believes every man should have a certificate from the health officer of freedom from syphilis and gonorrhea before he is granted a marriage license. Until this is enacted, the parents of the bride should demand from the prospective groom a certificate of freedom from venereal disease, by a physician of their selection. If this could be brought about, there would be no necessity for fully one-half of the sections now made, and a corresponding amount of suffering, both mental and physical, would be obviated.

DR. J. HENRY CARSTENS of Detroit, in discussing the three preceding papers, said that when prominent ministers of churches consulted physicians and asked them

to produce abortion on their wives, he became discouraged, and thought it was love's labor lost. Still, the gynecologist should keep on preaching against the evils attending the production of abortion.

Regarding Dr. Dorsett's paper, the too frequent opening of the abdomen stimulated incompetents to do likewise, and, as a consequence, results were disastrous, eventually reacting on gynecologists.

DR. W. E. B. DAVIS of Birmingham, Ala., does not believe that gonorrhea plays so important a part in the production of pelvic inflammation as was heretofore taught. Fully fifty per cent. of the cases of pelvic inflammation are due to puerperal infection, either at the time of delivery at full term, or premature delivery. More importance is being attached to tubercular trouble as a cause of pelvic inflammation than it deserves.

DR. JAMES MCFADDEN GASTON of Atlanta (by invitation) said that extreme hygienic precautions might warrant, in some instances, the use of antiseptic washes prior to labor, but nature should be allowed to take its course, unless there were ample reasons for interference.

DR. ERNEST S. LEWIS of New Orleans operated on a patient, last winter, for what he supposed at the time was a small ovarian tumor, but, after the abdomen was opened, it turned out to be a retroverted gravid uterus.

DR. F. D. THOMPSON of Fort Worth, Tex., would like the essayists to have gone more fully into the point as to when it was safe for men who had been the subjects of gonorrhea to marry and have intercourse with their wives. Many cases of gonorrhea occurred in married men, and the gynecologist had before him all the ills and consequences incident to this disease. How long shall such men abstain from sexual intercourse? These points should be dealt with more fully and explicitly.

DR. LEWIS S. MCMURTRY of Louisville considered the view enunciated by Dr. Hall as to gonorrhea and its relations to marriage impracticable. The exploratory incision for diagnostic purposes should be sufficiently large to enable the surgeon to explore thoroughly the abdominal cavity.

DR. E. F. FISH of Milwaukee recalled one case in which an exploratory operation saved the patient's life.

DR. RICHARD H. GIBBONS of New York, thought many of the cases dealt with in the papers were due to puerperal contamination, or, in some instances, to laceration of the cervix, as had been pointed out by Emmett. He believes that Noeggerath gave us the keynote to the class of infection produced by gonorrhea. Relative to diagnosing intra-abdominal diseases, there was no particular symptom that was pathognomonic.

DR. HOWARD W. LONGYEAR of Detroit believes the teachers of the public schools should be empowered to impart the necessary knowledge regarding the dangers of gonorrhea and its consequences.

DR. GEO. BEN. JOHNSON of Richmond presented the specimen of an ovarian tumor, the first one removed under Listerism in the State of Virginia, so far as he had been able to ascertain. The patient was an unmarried woman, twenty-six years of age. The tumor was removed March 19, 1879. The tumor, with the sac and fluid contents,



weighed thirty-four pounds. The operation was performed under the spray and with the elaborate dressings recommended by Lister. The patient died, however from sepsis. In November of the same year he was consulted by Mrs. M., whom he presented to the Association, for what turned out to be an enormous unilocular ovarian tumor. Her measurements were six feet and four inches around the abdomen at the umbilicus, and three feet and two inches from the ensiform cartilage to the pubes. The contents of the tumor and the sac weighed ninety-six pounds. This operation was performed at the patient's house, with the same care as that of the previous one. Recovery.

ALBERT GOLDSPOHN, M.D., of Chicago read a paper on TUBO-OVARIAN CYSTS, WITH INTERESTING CASES.

In order to exclude a large number of ordinary tubo-ovarian conglomerates, we need to recognize the following minimum requirements in distinguishing a tubo-ovarian cyst: (1) The participation of the tube, which is easy enough from its position and connections. (2) To prove the participation of the ovary by demonstrating some ovarian tissues in the wall of the sac. (3) That their cavities are united by some opening through which the mucous membrane of the tube is continuous with the lining of the ovarian cyst or follicle. Applying this standard, the author has been compelled to exclude a number of cases that have been mentioned as such cysts, because the three points were not proven in each of the three cases. The total number of authenticated cases that the author has been able to find in literature is thirty-eight, by twenty-five different authors. His conclusions were as follows: (1) Tubo-ovarian cysts arise in consequence of a plastic inflammatory union between a Fallopian tube and the adjacent ovary, after either or both of these organs and the intervening peritoneum have experienced a non-purulent pathological change of a cystic character. The septum intervening between the two lumina disappearing in consequence of pressure-atrophy from the tension of liquid confined to one or both sides of it. (2) This union of a distended tube-cavity may occur also with that of a parovarian cyst (v. Ott), or with that of a peritoneal pseudo-cyst (Zedel). (3) In those rarer cases in which the fimbriae are really found floating in the interior of the main cyst-cavity, we must assume either the congenital anomaly of an "ovarian tube," as was seen by Schneidmahl in a mare, as a vitium primum formationis, or that an ovarian cyst or follicle-cyst ruptured, and the abdominal end of the tube dropped into the rent and was united to its edges by inflammatory action, thus making a joint cyst and tubal cavity.

WALTER B. CHASE, M.D., of Brooklyn, read a paper on

#### MIXED TUMORS OF THE OVARY.

These tumors of the ovary may be made up of a variety of cysts, or may be a combination of cysts and solid growths. Retention-cysts of the ovary are not tumors in a technical sense, and are never large. Large ovarian cysts are most often cyst-adenomas, and are not developed from Graafian follicles, but arise from the embryonic structure. The case reported, operated upon by the author at St. John's Hospital, August 4, 1894, was a

mixed tumor of the left ovary, consisting of a large cyst-adenoma, containing about two gallons of clear, straw-colored fluid, a dermoid intimately united with the cyst-adenoma, containing less than a quart of fluid, leaving true bony plates in its wall, and numerous encysted papillomas encrusted within the walls of both cysts.

(To be continued.)

### SECOND INTERNATIONAL CONGRESS OF GYNECOLOGY AND OBSTETRICS.

*Held at Geneva August 31 to September 5, 1896.*

(Concluded.)

#### HYSTERECTOMY.

DR. PAUL REYNIER of Paris referred to the danger of intestinal adhesions after hysterectomy, often a result, in his opinion, of septic processes. The practice of stuffing the vagina with iodoform gauze, except for hemorrhage, is a bad one, for adhesions with the intestine often result, and when the gauze is drawn out the intestinal coils are pulled into the upper vaginal orifice. If the intestine is inclined to prolapse it is better to close the peritoneal opening with suture or clamps, before introducing the gauze.

DR. DELANGEQUIERE of Mons presented a third series of abdominal hysterectomies for fibro-myomata. He mentioned certain improvements in technic.

The vagina and cervix are to be considered part of the operative field, and are to be sponged with iodoform gauze, and then cleaned with a one per cent. alcohol solution of bichlorid of mercury, and an aqueous solution of bichlorid of mercury of the same strength, followed by a light tampon of gauze.

For the final hemostasis, four pedicles are made corresponding to the arterial supply. A silk thread is passed through the vaginal wall, about the uterine artery. The utero-ovarian artery is included in a horizontal pedicle at the level of the vaginal reflection—just as in an oophorectomy. The bleeding of the vaginal margin is stopped by three sutures placed in front and behind, and drawing together the cut surfaces—as a final precaution the edges of peritoneum are stitched together. Drainage is a good thing. No drain is left in place more than forty-eight hours. A frequently renewed tampon, and, later, antiseptic injections, are advisable.

#### VAGINAL HYSTERECTOMY IN IRREDUCIBLE INVERSION AFTER CHILDBIRTH.

DR. DURET of Lille spoke of the difficulty of locating the incision in these cases, as the cervix is obliterated. Palpation is of some assistance. Seizing the neck of the tumor between thumb and finger, it is possible to make out by its thickness where the cervix begins, and the incision is made above this line, care being taken to avoid the contents of the infundibulum and the vessels. In fact, as soon as a transverse incision has been made anteriorly into the peritoneal cavity, it is better to complete the hysterectomy by means of a median incision. This starts from the transverse vaginal incision and splits the anterior wall of the uterus into a right and left half. The



adnexa are then easily seen, and may be ligated if desired. Next the uterus is raised and the posterior cul-de-sac transversely incised. The uterine arteries are ligated from the vagina, and the lateral ligaments are clamped. The median division of the uterus is then completed, the adnexa drawn down and ligated, and removed with the uterus.

#### SURGICAL TREATMENT OF RETRODEVIATIONS OF THE UTERUS.

DR. POZZI's conclusions were as follows:

All surgical treatment whose object is to fix the uterus by attachment to a limited area of its surface can have only temporary results. Constant traction upon the point of artificial attachment will in time produce again the displacement. This explains why Alexander's operation, and vagino- and vesico-fixation, give the uterus only a temporary stability, and, besides, many of these operations ought to be rejected because they are a real source of danger in future child-bearing.

The rational treatment of excessive mobility of the uterus (movable retrodeviation) may be expressed as follows, according to individual conditions: (a) Cure the metritis which so often exists by curettage, amputation of the cervix, etc. (b) Restore the perineum, if torn, by a suitable lactic operation. (c) Fit the patient with a pessary which, by distending the posterior cul-de-sac, holds the cervix in position; and regulate the intra-abdominal pressure by an abdominal belt.

In fixed retrodeviation of the uterus the principal lesion is not the displacement, nor the adhesions, but the diseased condition of the uterus, tubes, and ovaries; and treatment is to be chosen accordingly.

In many cases the trouble in the adnexa is secondary to that of the uterus, and passes away if the latter is properly treated; in others, the lesions in the adnexa are primary, and the metritis secondary. In such cases laparotomy is indicated, and if the trouble is of a mild character, such as cystic disease of the ovary without occlusion of the tubes, ignipuncture or partial resection of the ovary is to be performed. After adhesions are destroyed the uterus will right itself, but for safety it may be stitched to the abdominal wall. If the tubes are obliterated, and the ovaries more or less diseased, castration is the suitable operation; and by this means the symptoms, often falsely attributed to the uterine displacement, will be cured.

Vaginal hysterectomy is preferable in the presence of old bilateral lesions of the adnexa, with chronic metritis and hypertrophy of the uterus.

DR. KASTNER of Dorpat, discussing the same topic, drew the following conclusions:

The operative treatment of retroversion and retroflexion by holding the uterus in a forced anterior position prevents the formation of adhesions and ultimate prolapse, and reestablishes, to a certain degree, the mobility of the uterus and its pelvic relations. In immobile retrodeviations massage and Schulz's operation are to be employed, and laparotomy is indicated only if very strong adhesions exist. Abdominal section is, for this purpose, more exact, and allows of a more thorough treatment

than either anterior or posterior colpotomy. Abdominal, abdomino-vesical and vaginal fixation and Alexander's operation keep the uterus in a good position, which is not true of certain recently devised procedures, such as Sanger's retrofixation. Ventral and vesical fixation and Alexander's operation do not disturb the normal functions of the uterus. Vaginal fixation is not to be performed in women liable to bear children. If a tendency to prolapse exists the colporthaphies should be combined with vaginal fixation. If adhesions are extensive laparotomy should be performed, the adhesions broken up, and the uterus fixed to the abdominal wall. If the adnexa are diseased they are to be removed in part or altogether; but the advantage here of conservatism is never to be lost sight of. Curetting, baths, and other forms of symptomatic treatment are seldom advisable. Alexander's is the best operation for mobile retrofixation and retroversion, because it most nearly restores the parts to their normal position.

Indications for operative treatment are immobile retrodeviations, or lack of success with pessaries, or a deformation of the vagina, which prevents their employment.

As prolapse is usually secondary to retroflexion or retroversion of the uterus, any operation for its relief ought to reestablish the anterior position of the uterus. Hence the advisability of combining anterofixation of the uterus with the plastic operations designed to narrow the vagina.

DR. POLK of New York expressed himself as opposed to the fixation of the body of a retrodeviated uterus if the patient is still capable of becoming pregnant. He prefers Alexander's operation, supplemented, if need be, by shortening of the utero-sacral ligaments, through a vaginal incision. If adhesions are present, they are first to be broken up. This is also the proper treatment for a retrodeviated uterus in a patient from whom tubes and ovaries have been previously removed, and also for retrodeviation occurring after the menopause. These operations are performed as follows: The anterior vaginal vault is incised, the uterus and adnexa freed from adhesions, if such exist. The uterus is anteverted, and its fundus drawn into the vagina. A silk suture is passed about the round ligament with its peritoneal investment far enough from the uterus to permit the sutured portion to be brought easily to the attachment of the ligament at the uterus. The loop thus made is sutured together and returned to the round ligament beyond the point of reduplication. The procedure is repeated on the opposite side and the vaginal opening is closed. In order to shorten the utero-sacral ligaments, a transverse incision is made in the posterior cul-de-sac, and a silk ligature is passed through the ligament at about its middle, and then through the tissue at the junction of the vagina with the cervix. The ends of each suture are brought through into the vagina, tightly knotted, and left long until both are in position and ready for tightening. When the sutures are tightened the ligaments are doubled upon themselves, and by this means the cervix is pulled backward and upward. The cul-de-sac is closed with catgut. The drain is taken out in two weeks, but the patient must not get up for three weeks.

DR. PÉAN of Paris drew these conclusions from his practice:

Mobile retrodeviations are to be treated by pessaries with a hard surface, permitting cleaning, such as aluminum has. The necessary plastic operations should precede their application.

If recent or light adhesions are present, mobility should be secured as soon as possible by medicinal means. If these fail, Sims' articulated repositior or Brandt's massage should be tried.

When the adhesions are so firm that they will not give way, the finger should be introduced into Douglas' cul-de-sac, the territory explored, and any adhesions broken up, and small tumors of the tubes or ovaries removed.

If, in spite of all care, the pains continue, in order to prevent a relapse, the uterus should be fixed anteriorly, preferably by freshening its anterior surface and that of the bladder, and suturing the two.

If the uterus is bound down so firmly that it cannot be replaced, conservative treatment is inadvisable, as the lesions are certain to have affected tubes and ovaries to such an extent that complete castration is the only allowable operation.

DR. JACOBS of Brussels reported that he had had better results with anterior vaginal fixation than with abdominal fixation.

DR. KUMMER of Geneva reported twenty-two patients with uterine deviation, combined in several instances with prolapse of different degrees, upon whom he had performed Alexander's operation with gratifying results. Only one case relapsed.

DR. CHALEIX-VIVIE has learned from the examination of a great many women who have submitted to operations for retroversion that the restoration of the uterus, if unaccompanied by other treatment, is followed by a cure in comparatively few cases; and that it is equally important, to dilate and curette in endometritis, to amputate a diseased cervix, and to restore a distorted vagina and perineum.

DR. OTTO ENGSTROM favors ventrofixation when surgical interference is necessary. He uses a single suture including the peritoneum and base of the uterus, removing it on the fourteenth day. This fixation becomes peritoneal and elastic, and gives the uterus almost a normal mobility.

DR. MANGIN of Marseilles summed up the treatment employed by him: the pessary in movable retrodeviations, and if it is not well borne vaginal colpohysteropexy with any necessary vaginal plastic operations. Alexander's operation and ventrofixation he reserved for patients with lax tissues. In complicated deviations he seeks to reduce the conditions to simple ones by medical treatment, and then to apply the above rules. If the adnexa are seriously involved his rule is to perform laparotomy for unilateral lesions and hysterectomy for bilateral ones.

#### INFLUENCE OF COCCYGEAL MOBILITY UPON RETRO-DEVIATION.—COCCYGECTOMY.

DR. BLONDEL of Paris insisted upon the importance of

the coccyx in backward displacements. He said that abnormal mobility of this bone, resulting from traumatism, or more often from childbirth, allowed a displacement forward of the anus and vagina of an inch or more with the formation of a posterior colpocele and retrodeviation. This condition may or may not be accompanied with coccygeal pain. A very long Hodge pessary or a posterior colporrhaphy may give some relief, but if there is much pain and removal of the adnexa is not formally indicated, he counsels a coccygectomy with suture of the levator ani to the sacrum. The operation is in no wise dangerous, and if successfully accomplished it cures the retrodeviation by driving backward and upward the cervix.

DR. STAFFER of Paris spoke of the excellent results he had obtained by massage and gymnastics, and expressed his appreciation of massage as a means of diagnosis.

DR. BOYER of Paris claimed that massage can relieve the pain even though the uterus remain in a false position.

DR. CHAMAIN of Paris thought electricity was indicated in all recent movable retrodeviations, combined with appropriate hygienic and medical treatment, and preceded if need be by mechanical treatment, especially taxis. He employs the continuous current with the positive pole in the uterus, and the negative pole on the lower abdomen and large enough to reach both groins—or the faradic current with a double external electrode, one over each inguinal region, and frequently alternating the current. Static electricity is also used. In any case vigorous asepsis is observed.

The meeting of September 3d was opened with discussions on

#### THE BEST METHOD OF CLOSING THE ABDOMEN.

DR. GRANVILLE BANTOCK of London finds the simple suture sufficient in the majority of cases. When the patient is very thin or very fat the peritoneum ought to be first closed by a continuous suture, and afterward the rest of the abdomen may be closed by ordinary sutures in one or two layers. For interrupted sutures he considers silkworm-gut the best; catgut for the deep sutures.

DR. F. LA TORRE of Rome spoke of the frequency of hernia when the extraperitoneal method of closing the abdomen was used. A section made on the *linea alba* is often the cause of hernias. These do not generally follow when the section is made in the muscle itself; silk, catgut, silkworm-gut and silver wire are usually employed; however, the author prefers silk or catgut. The best method is that in several layers, and preference is given to a continuous suture in the peritoneum.

DR. BYFORD of Chicago spoke of the imperfect coaptation and infection as causes of post-operative hernias; he employs the following method: A certain number of buried sutures of silkworm-gut (three cm. apart) are placed in layers, comprising the muscular layer, the aponeurosis, and the peritoneum; before fastening these sutures he puts a few sutures (one cm. apart) through the entire thickness of the abdominal wall. The majority of hernias in his cases occur after several years, espe-



cially in cases where he had employed prolonged drainage. In cases of laparotomy, requiring only an incision below the umbilicus, he cuts directly in the muscle alongside of the *linea alba*; on the other hand, when the incision is to be long, and when the abdominal wall is distended and thinned by a tumor, he recommends resection of the *linea alba*.

DR. ALBAN-DORAN of London thought that two years must elapse before the danger of hernia is past. His sutures are about the same as those of Dr. Granville Bantock. Hernias, he said, are often due to the carelessness of the patients who do not wear their bandages for a long enough time.

DR. RAPIN of Lausanne spoke of the importance of having the suture line show as little as possible, especially in the case of young women. To obviate this he recommends horizontal incision, concave upward, three or four cm. above the symphysis pubis; this incision cuts through the skin, and the adipose tissue, as far as the aponeurosis, and fastens the upper flap with a provisional suture a little below the umbilicus. Then he makes a vertical incision (four to eight cm.) in the middle line through the aponeurosis muscles and the peritoneum. The wound is closed in three different layers. He removes the skin sutures on the third day in order to prevent any scars.

DR. KUMMER of Geneva in his experiments on animals always had more hernias in the case of *simple* sutures, than when he employed silk sutures in layers.

DR. JAYLE of Paris employs catgut for the peritoneum and muscles, and buried silk sutures for the skin, and two or three silk sutures, comprising the skin, cellular tissue, and the aponeurosis.

DR. VENGSTROM of Helsingfors passes silk sutures through the entire thickness of the abdominal wall, but before fastening them, sutures with catgut the peritoneum and the aponeurosis. He lays great stress on not fastening the sutures too tightly.

#### OBSTETRIC SESSION.

In the obstetric wing of the Congress reports were presented upon the relative frequency and the most common forms of pelvic narrowness in different countries.

The session of September 5th was opened by a discussion on the

#### TREATMENT OF ECLAMPSIA.

DR. CHARPENTIER of Paris emphasized the importance of examining the urine of pregnant women. If the slightest trace of albumin be found a milk diet should be ordered. This is the preventive treatment par excellence for eclampsia. In cases of edema without albuminous urine a milk diet is advantageous if not absolutely necessary. If the eclamptic patient is strong and very cyanosed, from 300 to 500 grams of blood may be taken. Then follows the administration of chloral. Chloroform inhalations will mitigate the convulsions, and injections of artificial serum will bring about diuresis. If there is no well-marked cyanosis, and the convulsions are infrequent, treatment may be restricted to chloral. If the contractions are too feeble or slow, the case must be terminated by version or forceps if the child is living; by cephalotomy,

basiotripsy, or cranioclasty if the child is dead. Labor should rarely be induced. Cæsarean section and *accouchement forcé* are only to be resorted to in the most extreme cases.

DR. F. HALBERTSMA of Utrecht considers active intervention necessary, when the prognosis seems extremely grave on account of complete anuria, or of the frequency and intensity of the convulsions, when there is no indication of labor, or when labor may be expected to be long and difficult, as in primiparæ and multiple pregnancies.

DR. VEIT of Leyden finds a mixed treatment gives the best results: Hasten labor prudently, rupture the membranes and deliver the patient after complete dilatation of the soft parts, give strong doses of morphin to lessen the number of convulsions, avoid oral administration of medicine to unconscious patients, produce diaphoresis by external means.

DR. BYERS of Belfort said that hypodermic injections of morphin should be administered at the onset of the convulsion. Care should be taken that fluid does not enter the lungs. Pulmonary edema is a common cause of death in eclampsia. The patient should be kept warm and purged freely. She should be given no liquid, and according as she is conscious or not between the attacks a warm or vapor bath. If labor has not begun the convulsions should be treated, care being taken not to excite the uterus to action. Chloroform should be given after labor has begun.

## REVIEWS.

FOOD IN HEALTH AND DISEASE. BY I. BURNEY YEO, M.D., F.R.C.P., Professor of Therapeutics in King's College, London. New (2d) edition. In one 12mo. volume of 592 pages, with 4 engravings. Cloth, \$2.50. Lea Brothers & Co., publishers, Philadelphia and New York, 1896.

THIS is a very excellent handbook, divided into two very nearly equal parts; the first is devoted to "Food in Health," the second to "Food in Disease." In the first part the author takes up the various classes of food, questions of digestion and assimilation, preparation, dietaries, food for special periods, and finally the relative advantages of animal and vegetable foods. The remainder of the book is occupied with the problems of diet in different diseases and morbid conditions, not omitting the various "cures," and artificial alimentation. The three appendices contain hospital dietaries, sterilization and Pasteurization of milk, and select recipes, respectively. The importance of the subject, the industry of the author, and the usually indefinite notions of the average physician, render this contribution both a necessary and useful one. The author could well rest his reputation upon his most excellent "Manual of Medical Treatment," but he has enhanced it by his scientific and scholarly handling of the question of food. For its convenience in size, and the practical and sound advice therein contained, this should be the daily companion of the physician. Its success is assured.